CUTTING PLOTTER

FC4200-50 / FC4200-60

FC4210-60

MANUAL NO. FC4200-UM-251

SERVICE MANUAL

GRAPHTEC

FC4200-UM-251-08-9370

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1. INTRODUCTION

This plotter incorporates a digital servo drive to perform cutting and plotting operations at high speed and high precision.
Besides being used to cut marking film and other media, this plotter can also be used as a pen plotter.

1.1 Specifications

Specifications for the FC4200-50 and the FC4200-60

	FC4200-50	FC4200-60
CPU	32-bit CPU	
Configuration	Flatbed cutting plotter	
Drive system	Fully-digital servo drive	
Max. cutting area	590 × 430 mm	910 × 610 mm
Compatible media width	500 mm	666 mm
Max. cutting speed	65 cm/s	
Specifiable cutting speeds	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60,65 cm/s	
Cutting force	10 to 600 gf	
Min. character size	about 5 mm for alphanumerics (varies with the medium and font used)	
Mechanical step size	0.005 mm	
Programmable step size	GP-GL: 0.1, 0.05, 0.025, 0.01 mm; HP-GL™: 0.025 mm*1	
Repeatability precision*2	0.1 mm or less	
Distance precision*2	[Travelling distance × ±0.2% or less] or ±0.1 mm, whichever is larger	
Perpendicular precision	0.3/430 mm or les	0.4/610 mm or less
Registration mark reading precision*3	within 0.3 mm	
Max. no. of pens	2 pens can be concurrently mounted	
Compatible blade type	Supersteel, ceramic, and sapphire blades	
Compatible pen types	Water- and oil-based ballpoint pens	
Compatible cutting media	Marking film (polyvinyl, fluorescent, reflective) Paper of 0.5-mm thickness or less (pattern paper, oilboard)*4 Compressed polystyrene sheets of 0.8-mm thickness or less*5 Sandblasting rubber of 1.5-mm thickness or less*5 High-luminance reflective film*6	
Interfaces	RS-232-C serial and Centronics-compatible parallel interfaces (automatic selection)	
Buffer capacity	2 Mbytes	
Resident command sets	GP-GL and HP-GL™ (selected at the control panel)	
LCD display	20 characters x 2 lines	
Rated power	100 to 120 VAC, 50/60 Hz; 220 to 240 VAC, 50 Hz (specify when ordering)	
Power consumption	120 VA or less	
Operating environment	10 to 35°C, 35 to 75% R.H. (non-condensing)	
External dimensions (WxDxH)	approx. 857 x 780 x 200 mm	approx. 1172 x 964 x 200 mm
Weight (without stand)	approx. 19 kg	approx. 26 kg

*1 HP-GL is a registered trademark of Hewlett-Packard Company.
*2 The figure varies with the type of Graphtec-designated medium used and the currently selected cutting conditions.
*3 Based on the precision when using the pen provided and high-grade paper to read this plotter's resident pattern.
*4 For use with the CB15U or CB15U-K30 cutter blade.
*5 For use with the CB15U-K30 cutter blade.
*6 For use with the CB15UA cutter blade.

Specifications for the FC4210-60

	FC4210-60
CPU	32-bit CPU
Configuration	Flatbed cutting plotter
Drive system	Fully-digital servo drive
Max. cutting area	860 × 600 mm
Compatible media width	666 mm
Max. cutting speed	65 cm/s
Specifiable cutting speeds	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60,65 cm/s
Cutting force	0.098 to 5.88 N (10 to 600 gf)
Minmum character size	about 5 mm for alphanumeric characters (varies depending on the medium and fonts used)
Mechanical resolution	0.005 mm
Programmable resolution	GP-GL: 0.1, 0.05, 0.025, 0.01 mm; HP-GL™: 0.025 mm*1
Repeatability precision*2	0.1 mm or less
Distance precision*2	Travelling distance × ±0.2% or less or ±0.1 mm, whichever is larger
Perpendicular precision	0.4/610 mm or less
Registration mark reading precision*3	within 0.2 mm
Maximum number of tools	2
Compatible blade type	Supersteel blade
Compatible pen types	Creasing/scoring tool, water- and oil-based ballpoint pens
Usatible cutting media	Marking film (polyvinyl, fluorescent, reflective) Cardboard of a thickness of 0.5 mm or less Paper of 0.5mm thickness or less (pattern paper, oilboard)*4 F, G grade microflute Clear sheet for packaging
Interfaces	RS-232-C serial and Centronics (automatic selected)
Buffer capacity	2 MB
Resident command sets	GP-GL and HP-GL™ (selected at the control panel)
LCD display	20 characters x 2 lines
Rated power-supply voltage	100 to 120 VAC, 50/60 Hz; 220 to 240 VAC, 50 Hz (specify when ordering)
Power consumption	120 VA or less
Operating environment	10 to 35°C, 35 to 75% R.H. (no condensation allowed)
External dimensions (WxDxH)	approx. 1172 x 964 x 200 mm
Weight (without stand)	approx. 27 kg

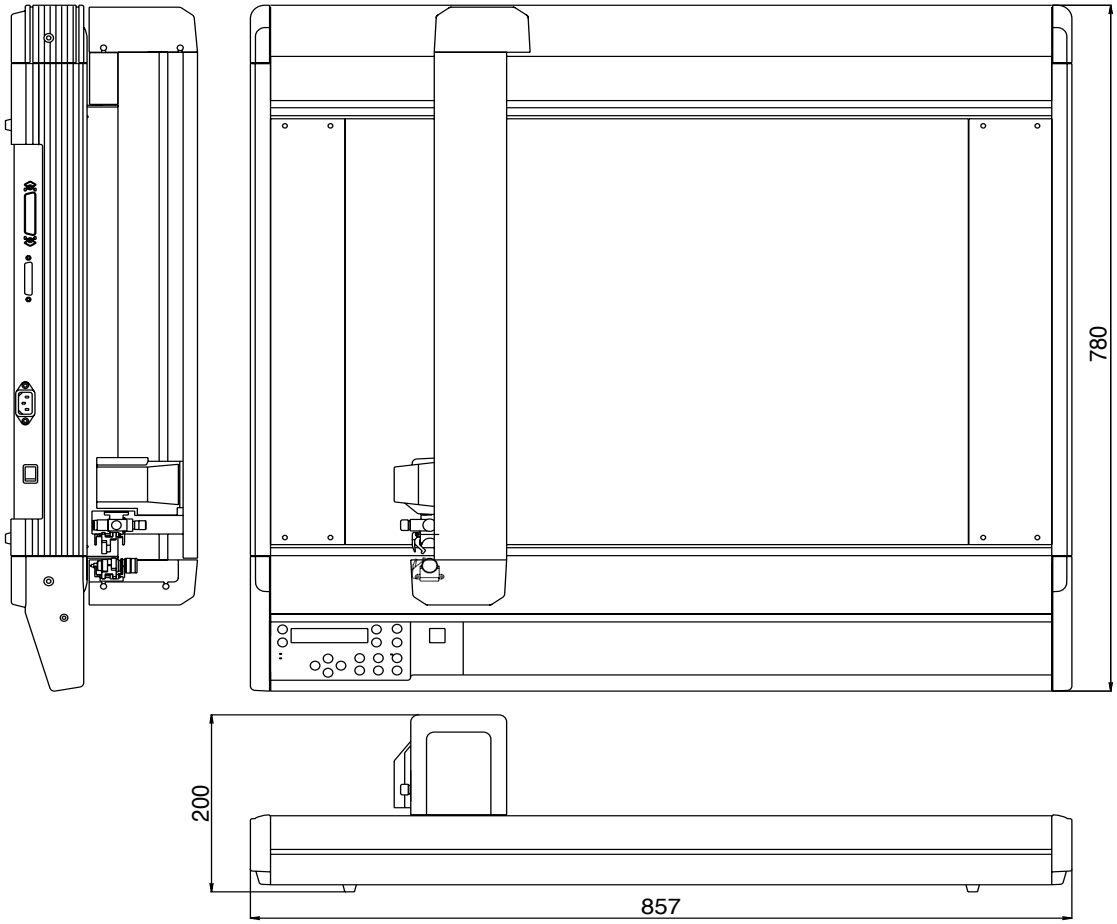
*1 HP-GL is a registered trademark of Hewlett-Packard Company.
*2 Depends on Graphtec-designated medium used and the currently selected cutting conditions.
*3 As determined by reading the plotter using the pen (included with the plotter) and high-grade paper.
*4 For use with the CB15U or CB15U-K30 cutter blade.

1.2 Options

Name	Part no.	Description
Stand	ST0032	Dedicated stand for the FC4200-60 and FC4210-60

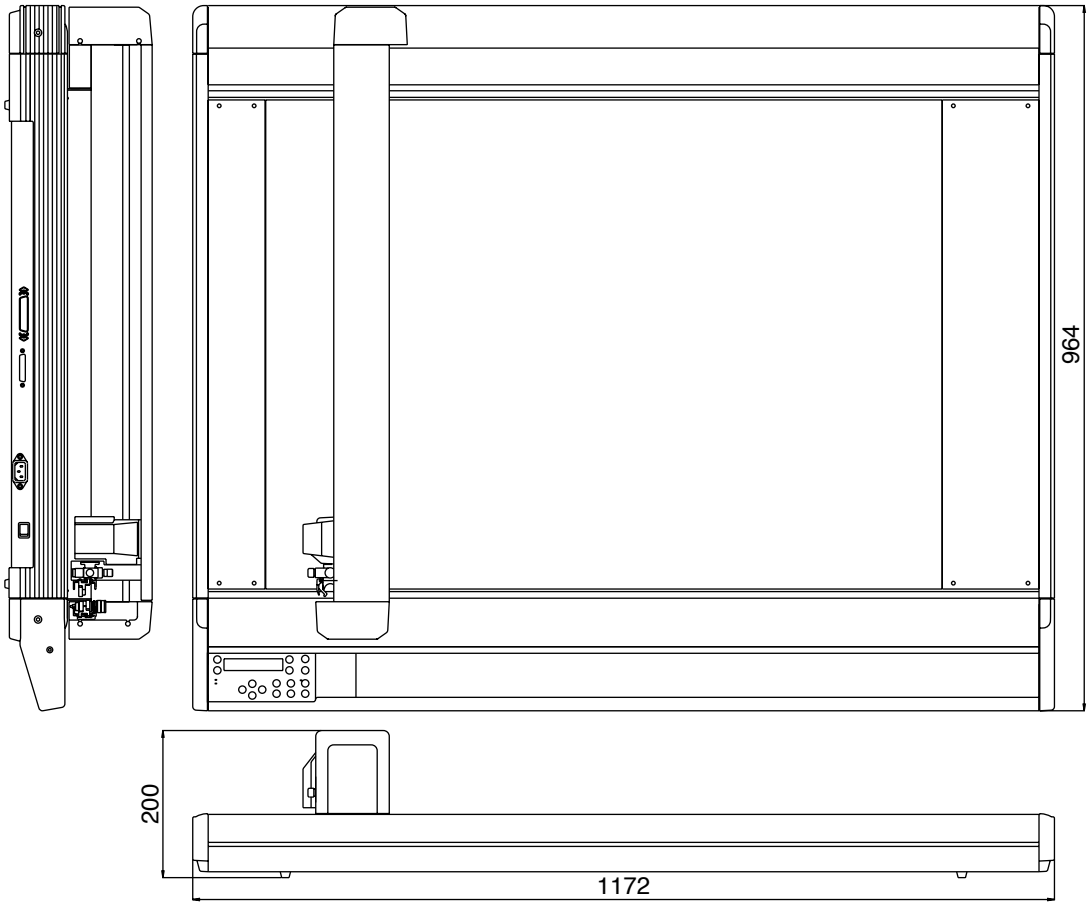
1.3 External Dimensions

The FC4200-50 Model



Unit: mm
Dimensional precision error: ±5 mm

The FC4200-60 and FC4210-60 Model (Excluding the Optional Stand)



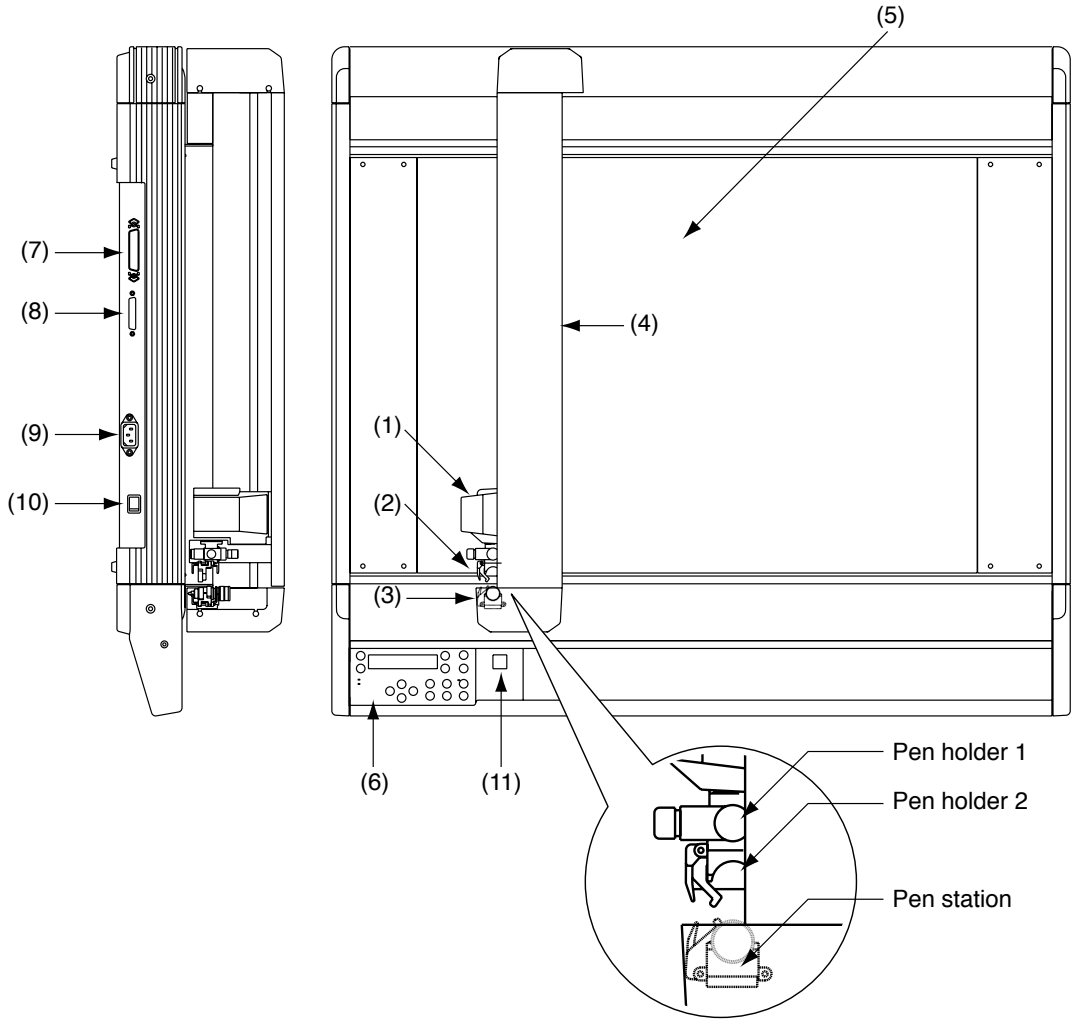
Unit: mm
Dimensional precision error: ±5 mm

2. NAMES OF THE MAIN PARTS

2.1 Plotter Nomenclature

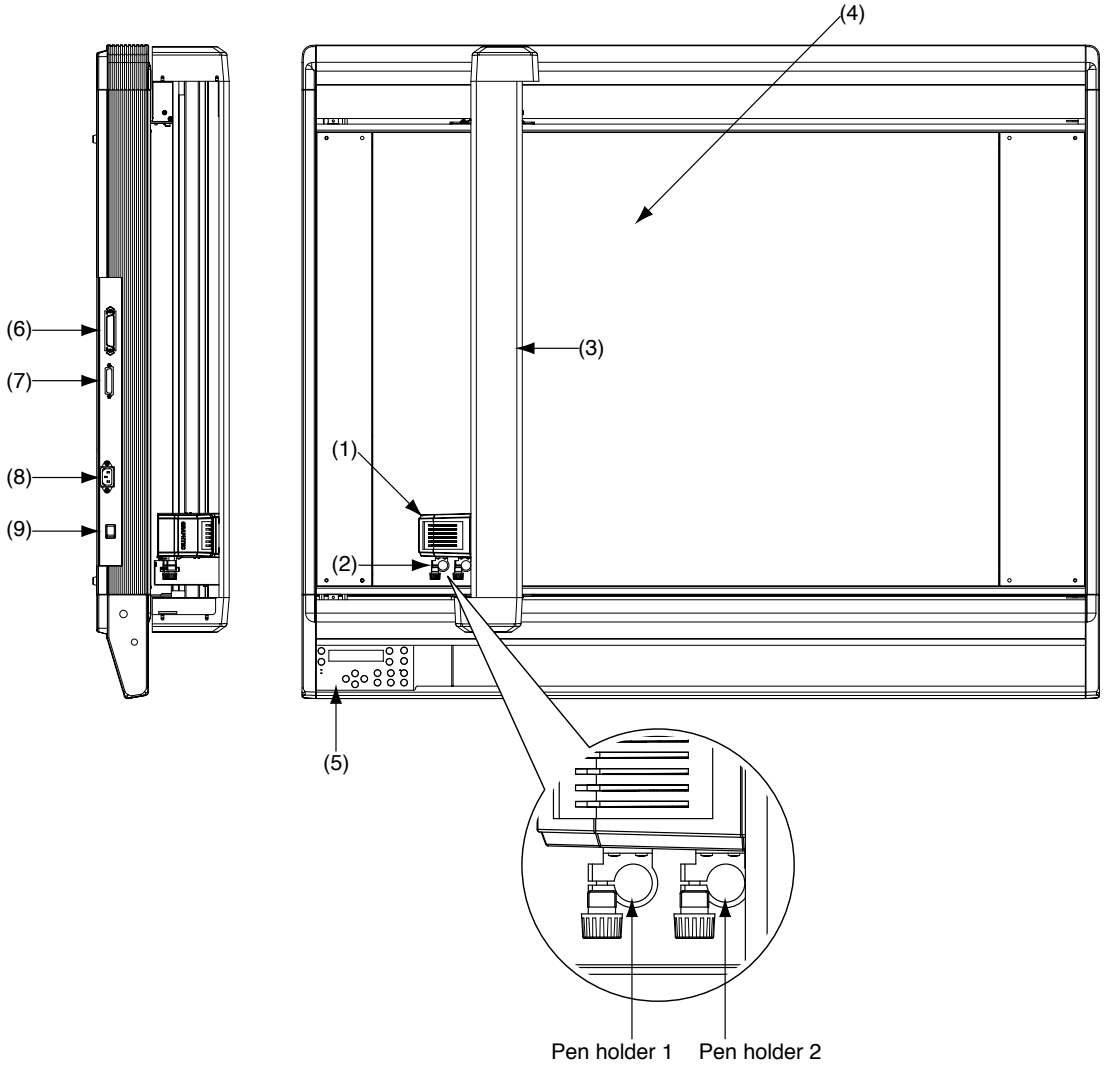
FC4200-50 / FC4200-60

(1) Pen carriage : Drives the cutter/pen to the left/right.
(2) Pen holder : Holds the cutter/pen and drives it up/down.
(3) Pen station : Holds a pen for plotting.
(4) Y bar : Holds the pen carriage; moves left/right.
(5) Writing panel : Cutting/plotting is performed here.
(6) Control panel : Used to set and use the plotter's various functions.
(7) Centronics parallel interface connector : Used to connect the plotter to a computer by cable via the Centronics-compatible parallel interface.
(8) RS-232C serial interface connector : Used to connect the plotter to a computer by cable via the RS-232C serial interface.
(9) AC line inlet : Connect one end of the power cord here and the other end to an electri cal socket.
(10) Power switch : Controls the on/off status of the power supply to the plotter.
(11) CHART HOLD key (–50 only) : Used to hold the medium.

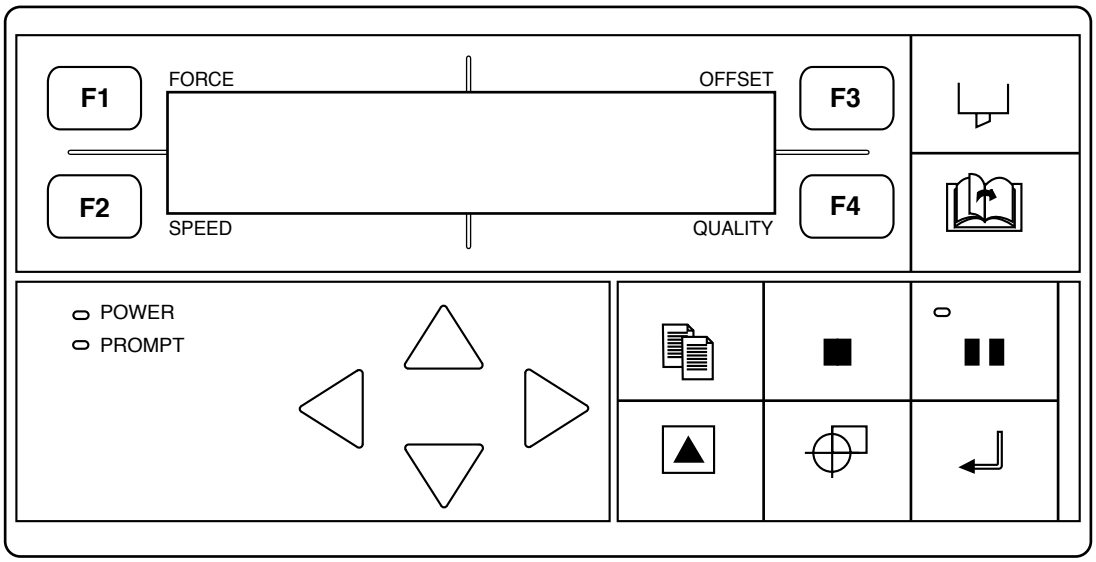


FC4210-60

(1)	Pen carriage	:	Drives the cutter/pen to the left/right.
(2)	Pen holder	:	Holds the cutter/pen and drives it up/down.
(3)	Y bar	:	Holds the pen carriage; moves left/right.
(4)	Writing panel	:	Cutting/plotting is performed here.
(5)	Control panel	:	Used to set and use the plotter's various functions.
(6)	Centronics parallel interface connector	:	Used to connect the plotter to a computer by cable via the Centronics-compatible parallel interface.
(7)	RS-232C serial interface connector	:	Used to connect the plotter to a computer by cable via the RS-232C serial interface.
(8)	AC line inlet	:	Connect one end of the power cord here and the other end to an electri cal socket.
(9)	Power switch	:	Controls the on/off status of the power supply to the plotter.



2.2 Control Panel



■ Indicator Lamps

POWER The POWER lamp remains lit (green) while the plotter is on.

PROMPT The PROMPT lamp lights (red) when the plotter receives data that will cause the pen carriage to move outside the effective cutting area.

■ Function Keys

The four function keys F1 through F4 are used to select a menu or to select a function on a displayed menu.

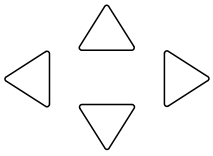
F1 Press the F1 key to select a function during Menu mode, to select Cutter Conditions 1 during Online status, or to change the cutting FORCE setting after the CONDITIONS key has been pressed.

F2 Press the F2 key to select a function during Menu mode, to select Cutter Conditions 2 during Online status, or to change the cutting SPEED setting after the CONDITIONS key has been pressed.

F3 Press the F3 key to select a function during Menu mode, to select Cutter Conditions 3 during Online status, or to change the cutter OFFSET setting after the CONDITIONS key has been pressed.

F4 Press the F4 key to select a function during Menu mode, to select Cutter Conditions 4 during Online status, or to change the cutting QUALITY setting after the CONDITIONS key has been pressed.

■ POSITION Keys



These POSITION keys function differently according to the plotter's operating status. They are used to change a setting on a displayed menu during Menu mode, but are used to move the pen carriage at all other times.
When a key is first initially pressed, the pen carriage moves slowly. When you continue to hold down the key, the pen carriage starts moving more quickly.

■ Menu Keys

PAUSE key: Press this key to enter Menu mode and light its green lamp. Press it again to cancel Menu mode and turn off the lamp. Press this key when you wish to proceed to set a function. If the plotter receives data after this key is pressed, it will temporarily store the data in its data buffer.

ENTER key: Press this key to register the selected setting when specifying a function. In Pause status, you can reset the plotter by concurrently pressing the ENTER and ORIGIN keys.

ORIGIN key: Used to change the position of the coordinate system's origin point. When the automatic detection of registration marks is enabled, press this key to initiate automatic detection.

COPY key: Used to repeat the cutting operation defined by the data in the plotter's buffer.

CONDITIONS key: Press this key to change any of the cutting conditions appearing on the plotter's display panel.

TEST key: Press this key to run a test to check whether the currently selected cutting conditions are suitable for the medium loaded.

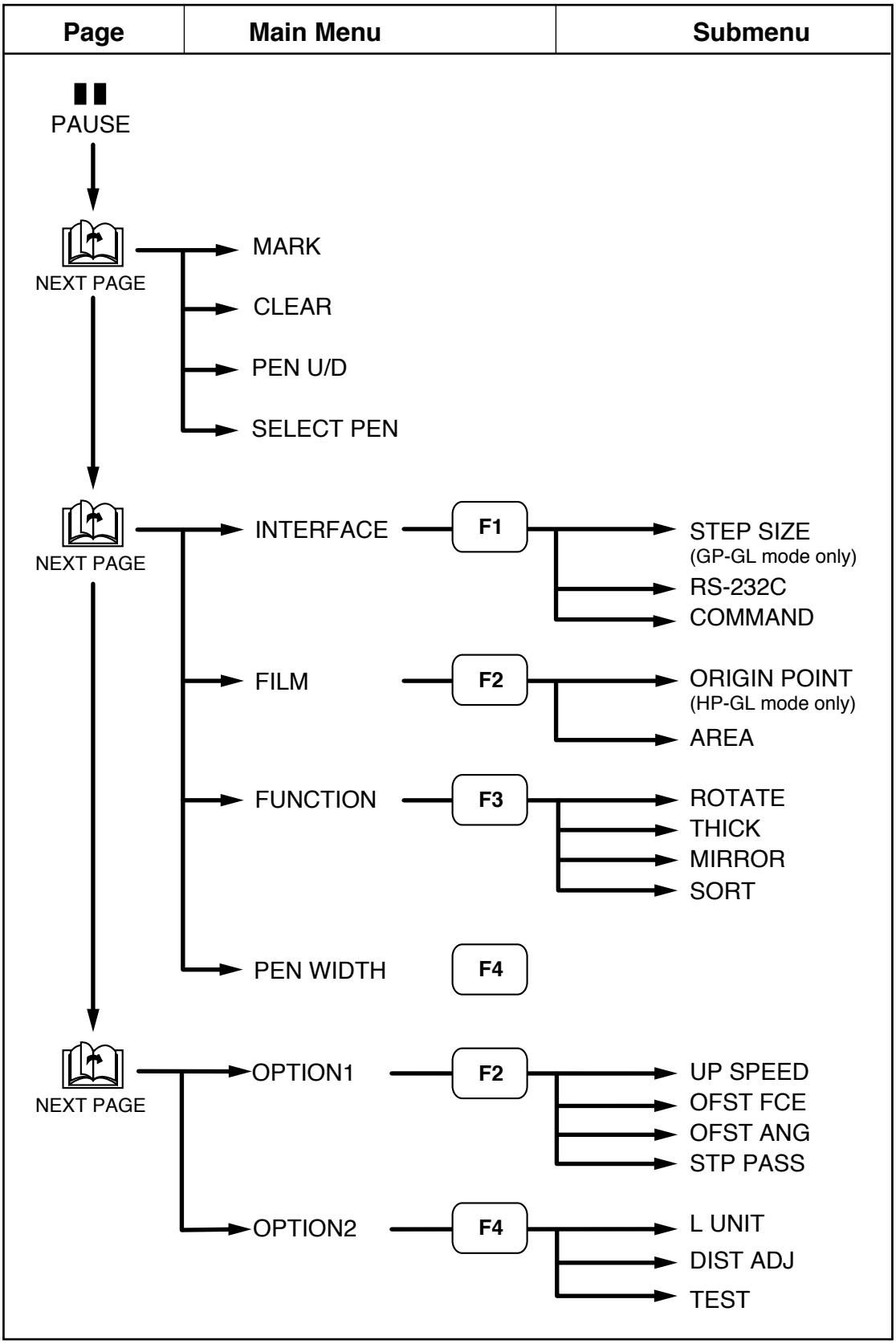
NEXT PAGE key: Press this key during Menu mode to proceed to the next menu page.

■

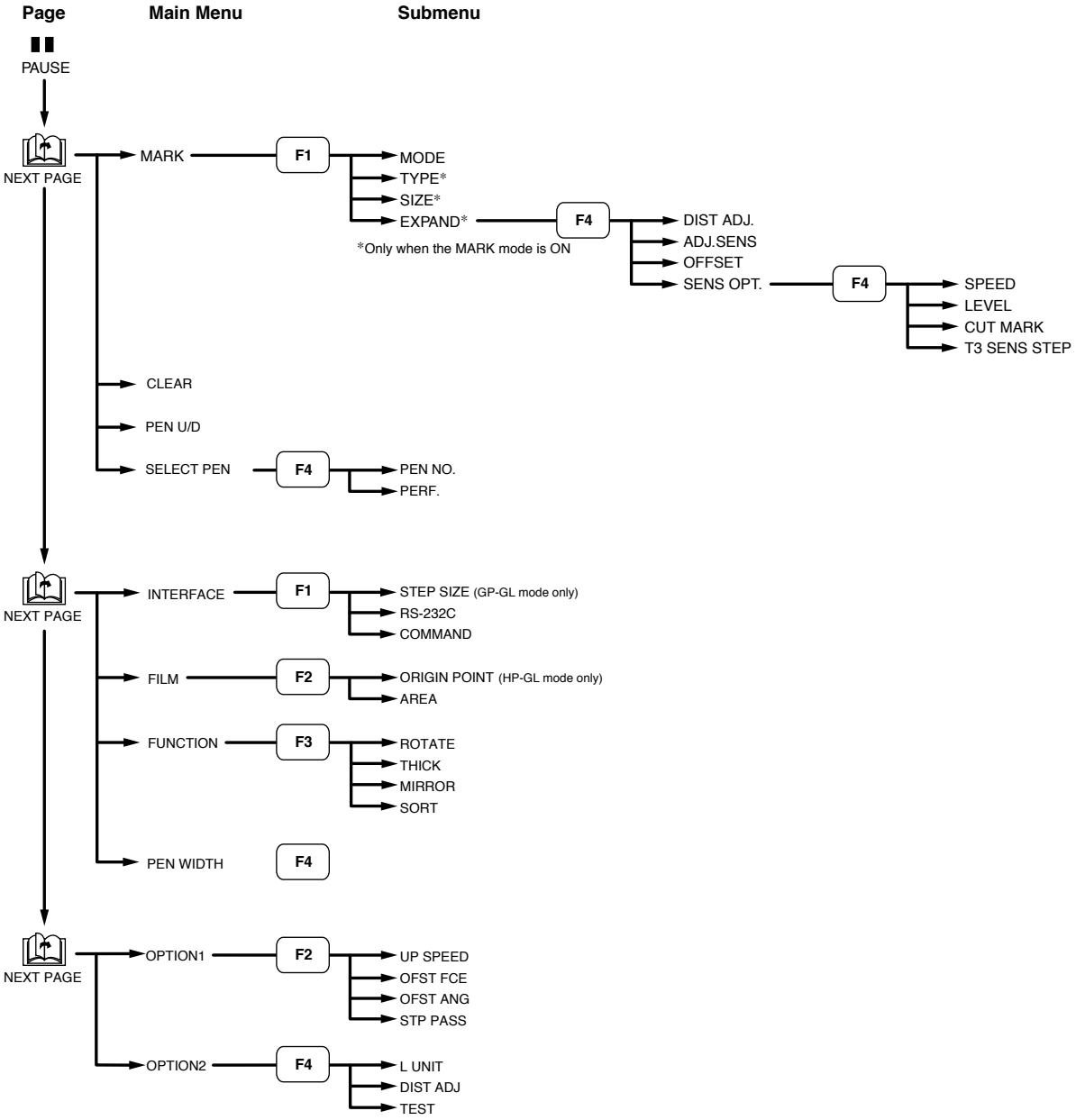
CANCEL/VIEW key: During a cutting operation, press this key to immediately stop cutting. While the Ready message is being shown on the plotter's display panel, press this key to move the pen outside of the maximum cutting/plotting area. To return the pen to its original position, press this key again.

3. The Tree Structure of Menus

■ In Menu mode for FC4200-50 and FC4200-60



■ In Menu mode for FC4210-60



How to change the displayed language

The menus of this plotter are displayed in English (Alphabet) by the factory setting.

If necessary, change the English display to Japanese (Kata-kana) display using the following procedure:

Turn the power on while pressing the F1 key : Display in Japanese (Kata-kana)

Turn the power on while pressing the F3 key : Display in English (Alphabet)

4. DAILY MAINTENANCE AND STORAGE

■ Daily Maintenance

During the course of daily plotter operation, be sure to observe the following precautions.

- Never lubricate the mechanisms of the plotter.
- If the plotter's casing becomes dirty, wipe the soiled areas using a dry cloth or a cloth that has been moistened in a neutral detergent diluted with water.
  Never use thinner, benzine, alcohol, or similar solvents; they will damage the casing's finish.
- If the writing panel becomes dirty, wipe it using a dry cloth. In case of stubborn stains, use a cloth that has been moistened in a neutral detergent diluted with water.
  Never use benzine, thinner, alcohol, or similar solvents to clean the panel.

■ Storing Your Plotter

To store the plotter when it is not being used, be sure to observe the following points:

- Remove the cutter and/or plotter pen attached to the pen holder and cover its tip with the protective cap provided.
- To protect the plotter from dust and dirt, cover it with a cloth.
- Avoid storing the plotter in places subject to direct sunlight or high temperatures.

5. LIST OF TOOLS

• Colex gauges (20g, 50g, 100g, 200g, 500g)

• Push-pull gauges (1kg, 2kg, 10kg)

• Ceramic Pen

• Cutter Pen Plunger

• Steal Scale (Up to 30mm)

• Personal Computer

• Centronics Interface Cable

• Gain Adjustment program

6. REPLACEMENT PROCEDURES

6.1 Precautions

6.1.1 Safety Confirmation

To prevent the plotter from malfunctioning and to ensure the safety of operators, please follow the instructions below:

- Before turning on the power for the plotter, take care that your hands, hair, or clothing are not caught up in the pen carriage or sliding mechanism.
- Before performing any work, turn off the power switch and unplug the power cord to ensure electrical safety.

6.1.2 Confirmation Before and After Operations

Before and after any operation, perform the following steps:

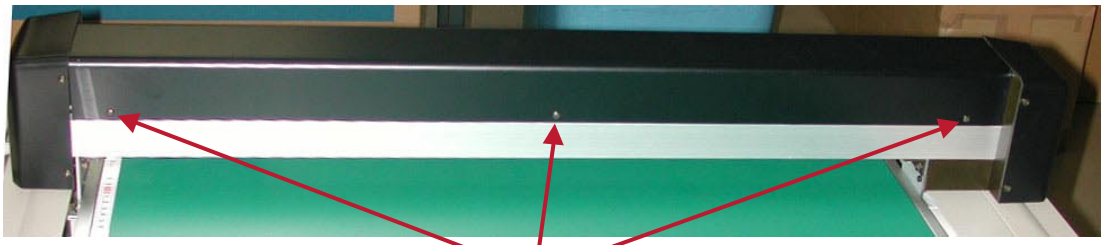
- Mark the part attachment positions with a pencil to ensure that parts can be restored to their proper positions.
- Confirm the order of parts assembly.
- Perform condition printing and self and cutting tests to check the plotter status before performing any operation. Confirm whether the plotter settings have changed and whether the plotter has trouble moving smoothly.

6.2 Removing the Y Rail Cover

Remove the M3L6 binding head screws securing the Y Rail Cover at five locations (two locations on the pen block side and three locations on the opposite side), in addition to the Rail Cover.

To replace the Rail Cover, reverse the above procedure.

M3L6 binding head screws



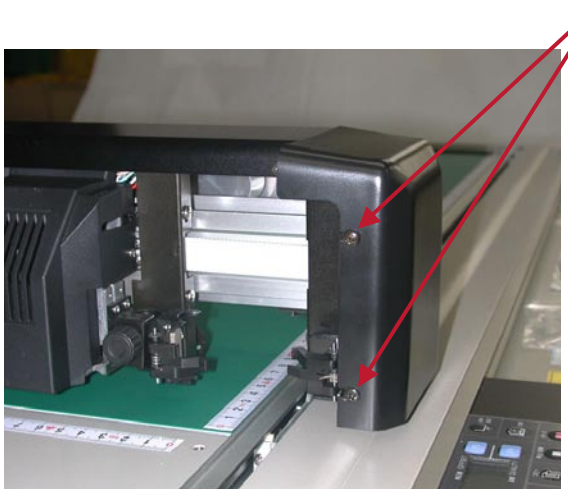
M3L6 binding head screws

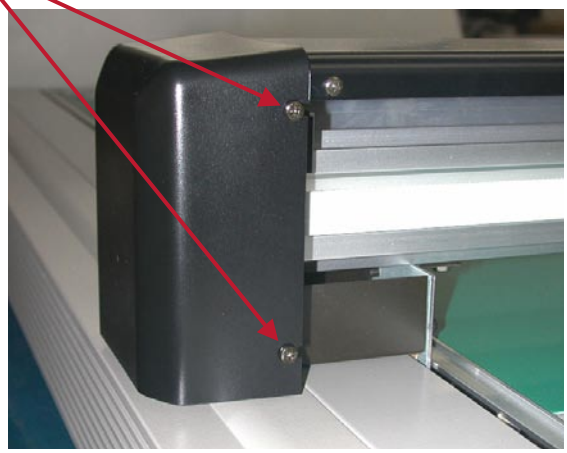
6.3 Removing the Front and Rear Y End Covers

Unfasten the M3L8 binding head screws securing the Front and Rear Y End Covers at four locations each, and then remove the Front and Rear Y End Covers.

To replace the Front and Rear Y End Covers, reverse the above procedure.

M3L8 binding head screws



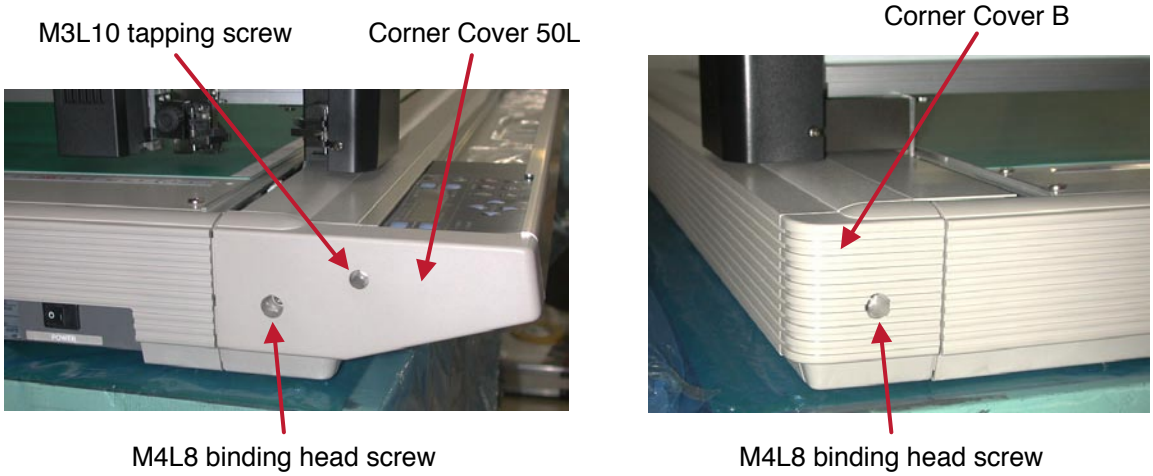


6.4 Removing the Corner Cover

Remove the two screws securing the Corner Cover 50L (left side) and Corner Cover 50R (right side) at the corners on the operation side (M3L10 tapping screw and M4L8 binding head screw, one pc. each), followed by the Corner Cover 50L and Corner Cover 50R.

Remove the M4L8 binding head screws securing the Corner Cover A (on right back side) and Corner Cover B (on left back side) on the main unit's rear side, followed by Corner Covers A and B.

To replace the Corner Cover, reverse the above procedure.



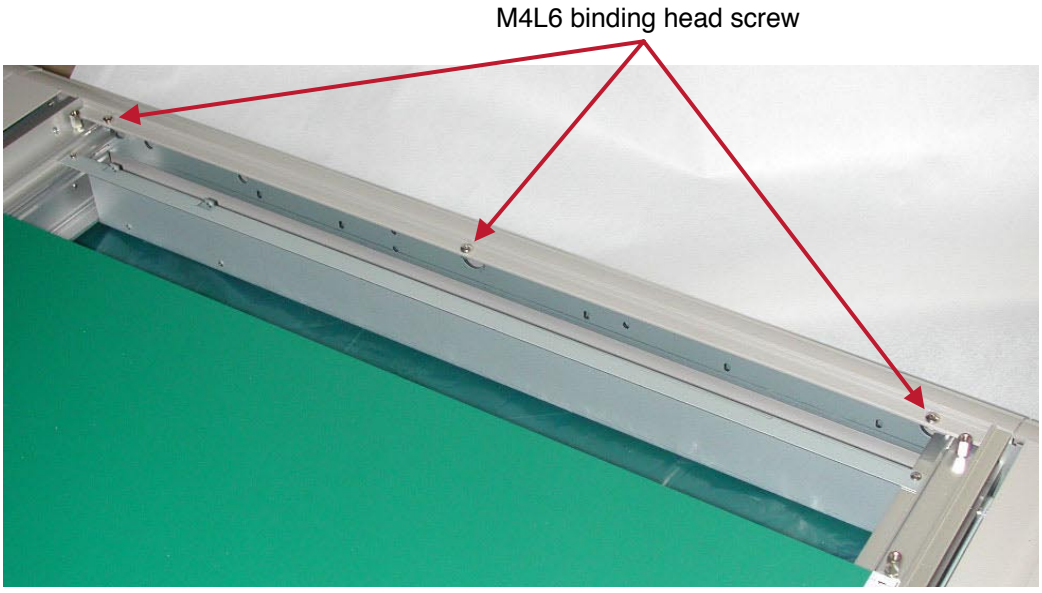
6.5 Removing the Right Side Cover

Remove the four M4L8 binding head screws securing Panel R, and then Panel R.

Remove Corner Cover A (on the right back side) and Corner Cover 50R.

Remove the seven screws securing the Side Cover (three screws at the top and four TP screws at the bottom), followed by the Side Cover.

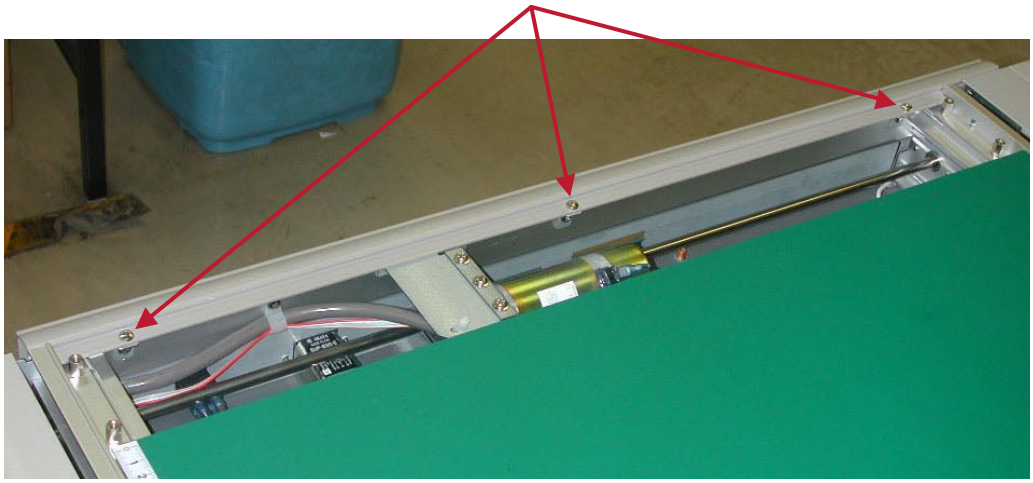
To replace the Right Side Cover, reverse the above procedure.



6.6 Removing the Interface Cover

Remove the four M4L6 binding head screws securing Panel L, followed by Panel L.
Remove Corner Cover A (on the right back side) and Corner Covers 50R and 50L.
Remove the five screws securing the Interface Cover (three screws at the top and two TP screws at the bottom), followed by the Interface Cover.
To replace the Interface Cover, reverse the above procedure.

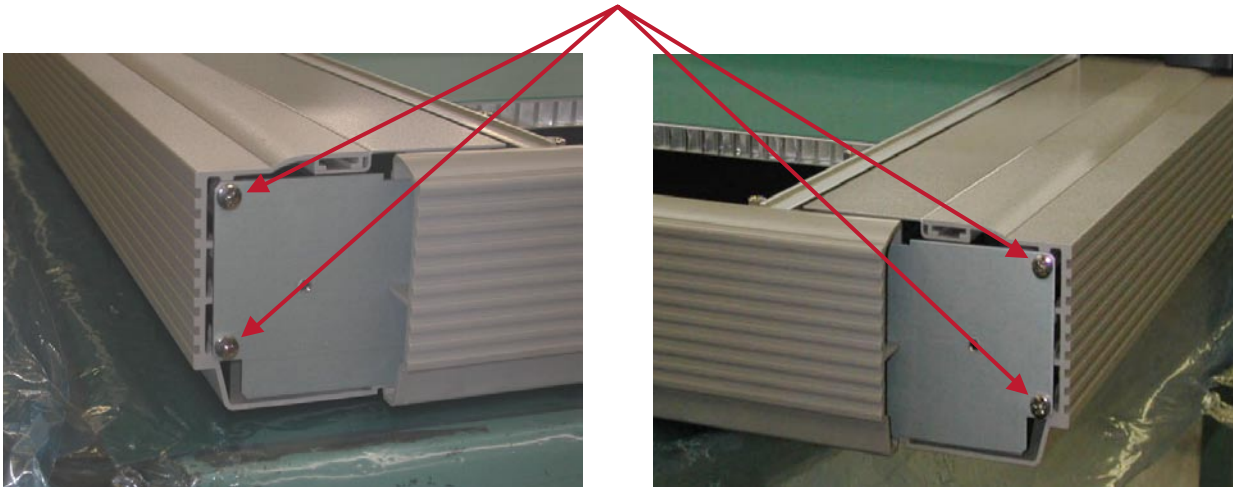
M4L6 binding head screw



6.7 Removing the Rear Cover

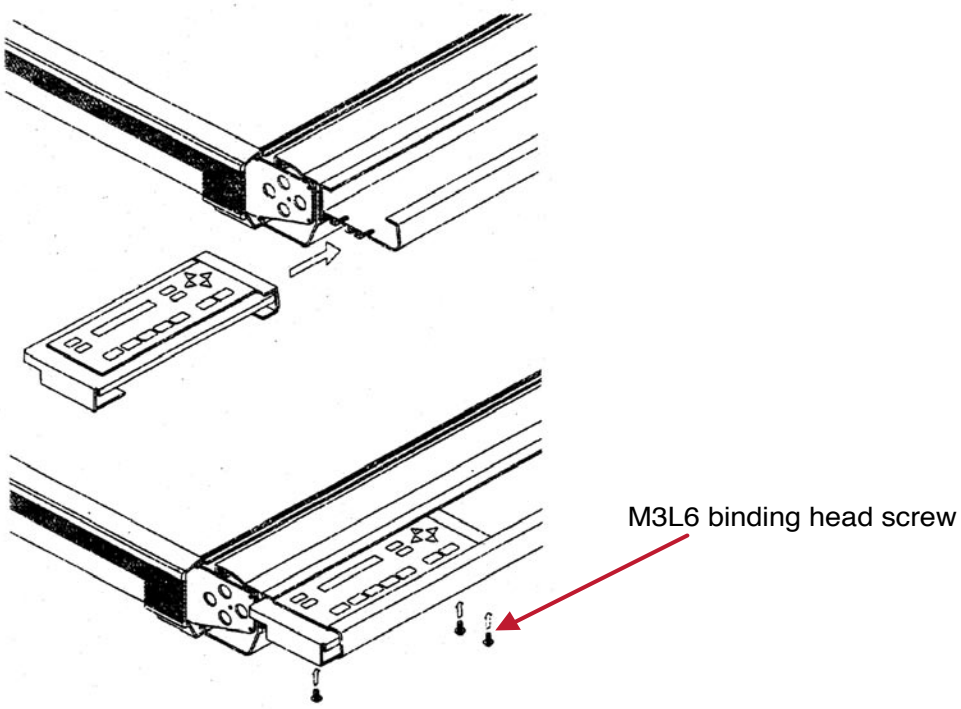
Remove Corner Cover A (on the right back side) and Corner Cover B (on the left back side).
Remove the seven screws securing the Rear Cover (2 x 2 screws on the corner cover side and three TP screws at the bottom), followed by the Rear Cover.
To replace the Rear Cover, reverse the above procedure.

M4L5 binding head screw



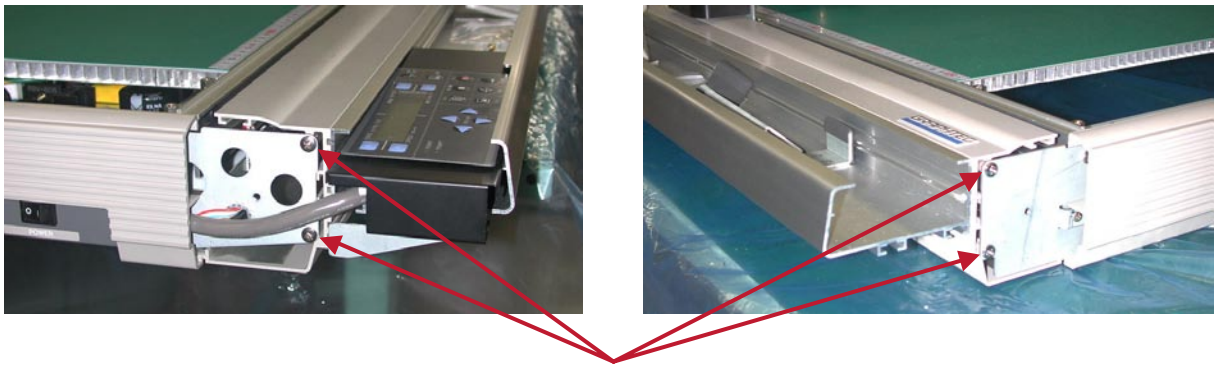
6.8 Removing the Operation Panel

Remove the two screws securing the Corner Cover 50L (left side) at the corner on the operation side (M3L10 tapping screw and M4L8 binding head screw, one pc. each), followed by Corner Cover 50L.
Remove the four M3L6 binding head screws securing the Operation Panel, followed by the Operation Panel.
To replace the Operation Panel, reverse the above procedure.



6.9 Removing the Operation Tray

Remove the two screws securing the Corner Cover 50L (left side) at the corner on the operation side (M3L10 tapping screw and M4L8 binding head screw, one pc. each), followed by Corner Cover 50L.
Remove the seven screws securing the Operation Tray (2 x 2 screws on the corner cover side and three TP screws at the bottom), followed by the Operation Tray.
To replace the Operation Tray, reverse the above procedure.

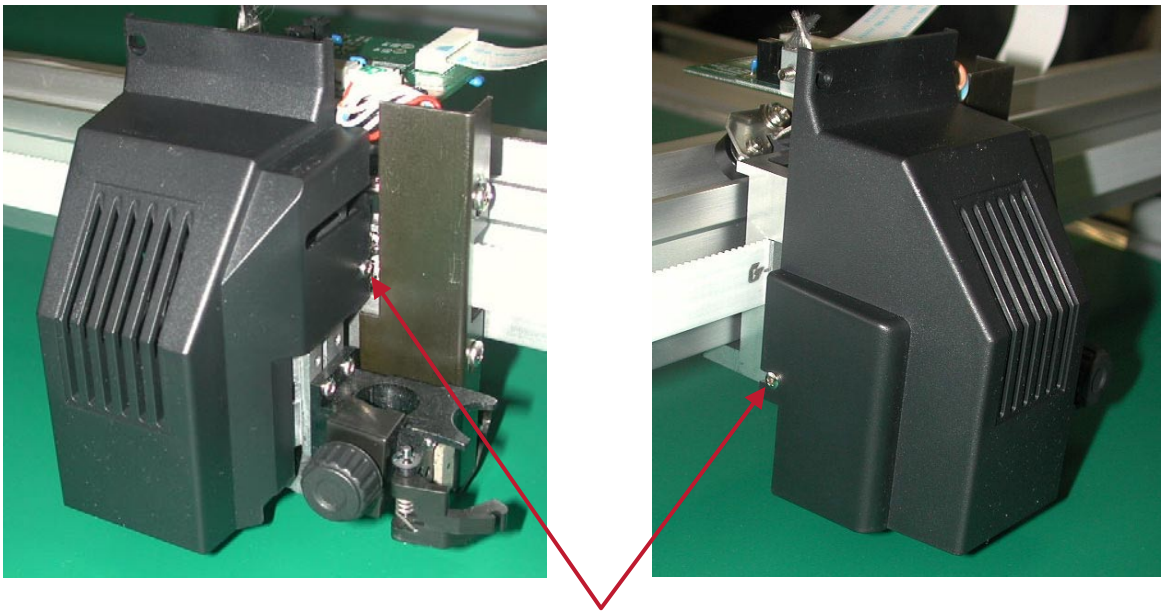


6.10 Changing Pen Blocks

Remove the Y Rail Cover.

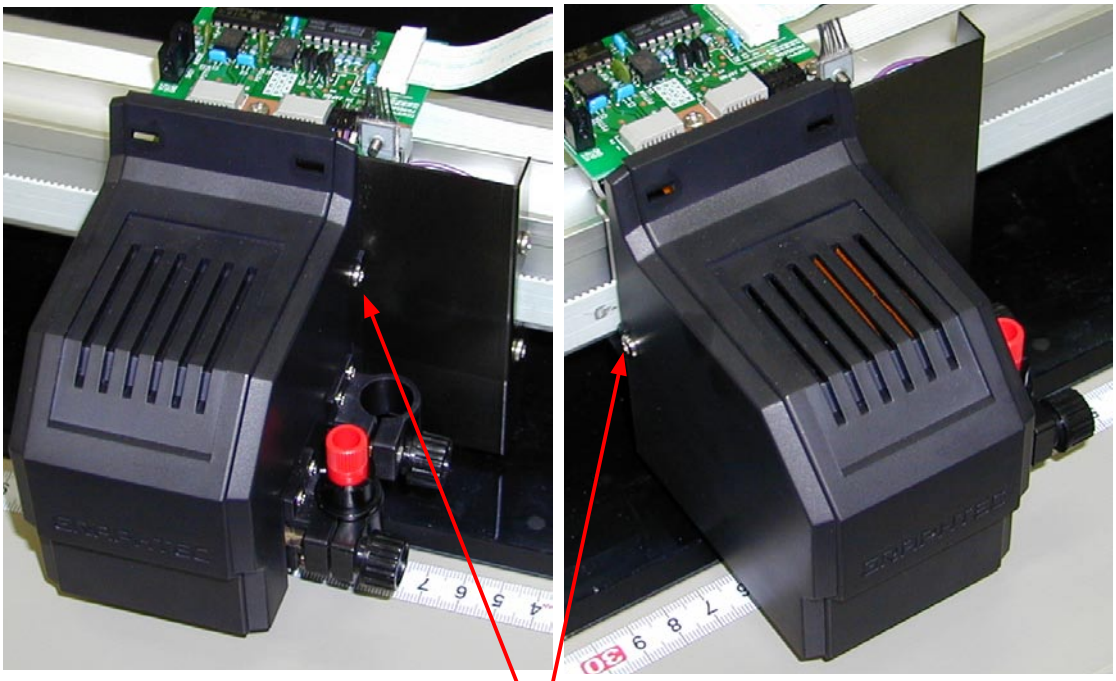
Unfasten the two screws securing the Carriage Cover, and then remove the Carriage Cover.

FC4200-50 / FC4200-60



Unfasten the screws

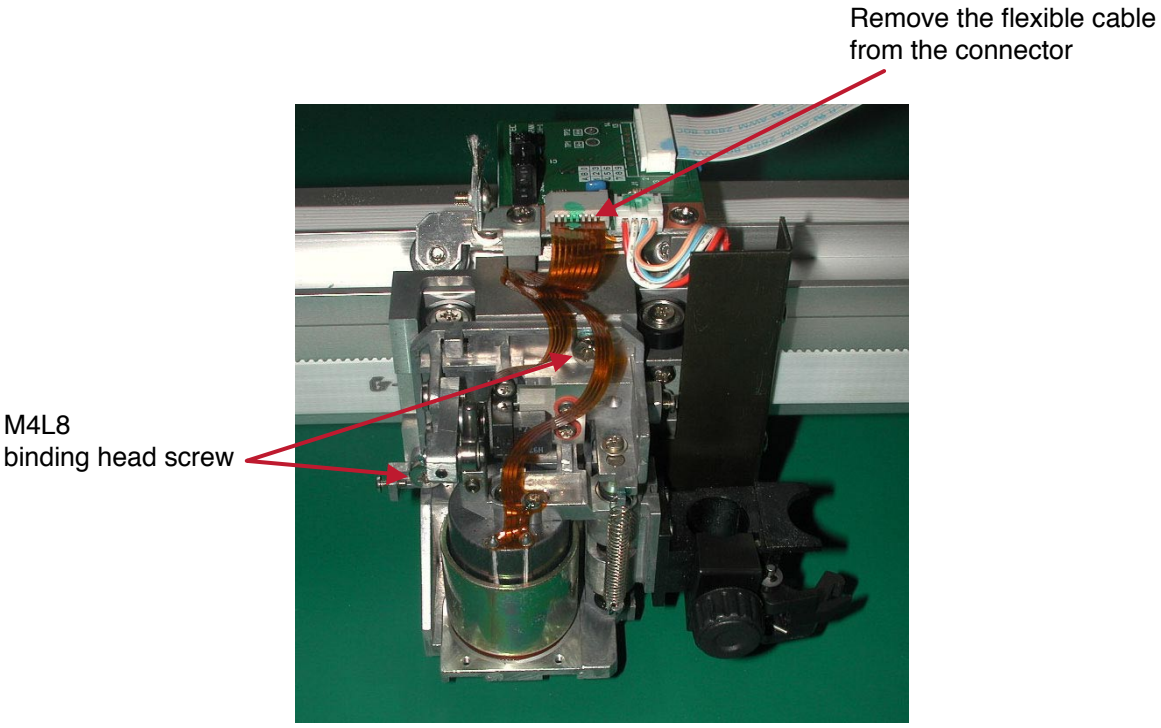
FC4210-60



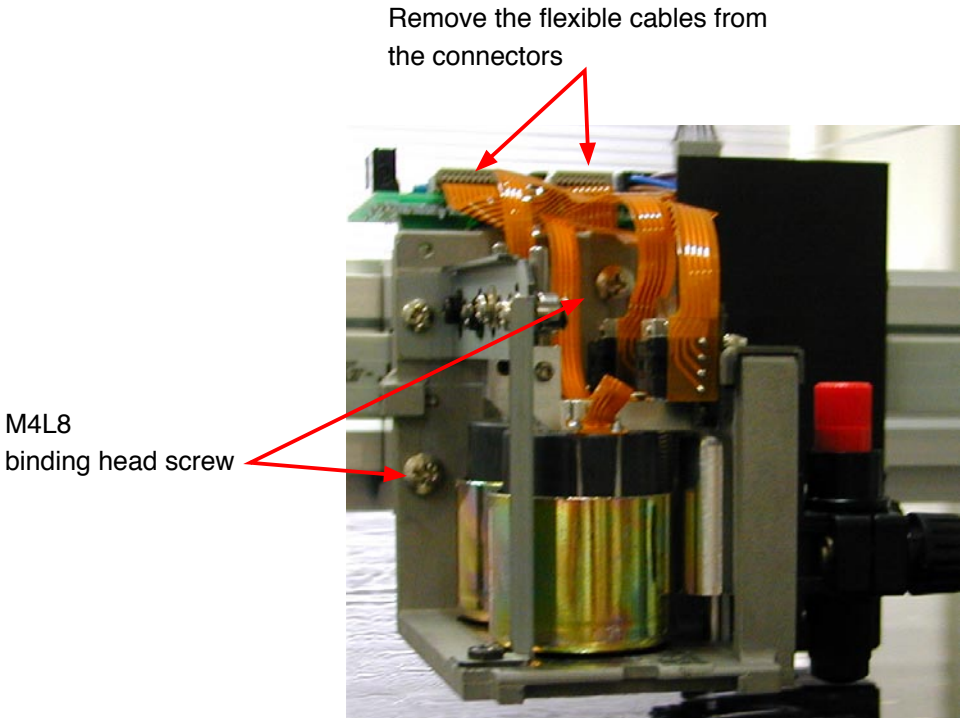
Unfasten the screws

Remove the flexible cable from the connector.
Remove the two M4L8 binding head screws securing the Pen Block, followed by the Pen Block.
To attach a Pen Block, reverse the above procedure after adjusting the Pen Block fitting height.
The Pen Block height must be adjusted to within 10 mm (10.5 mm for FC4210-60) from the Writing Panel to the bottom of the Pen Block.

FC4200-50 / FC4200-60



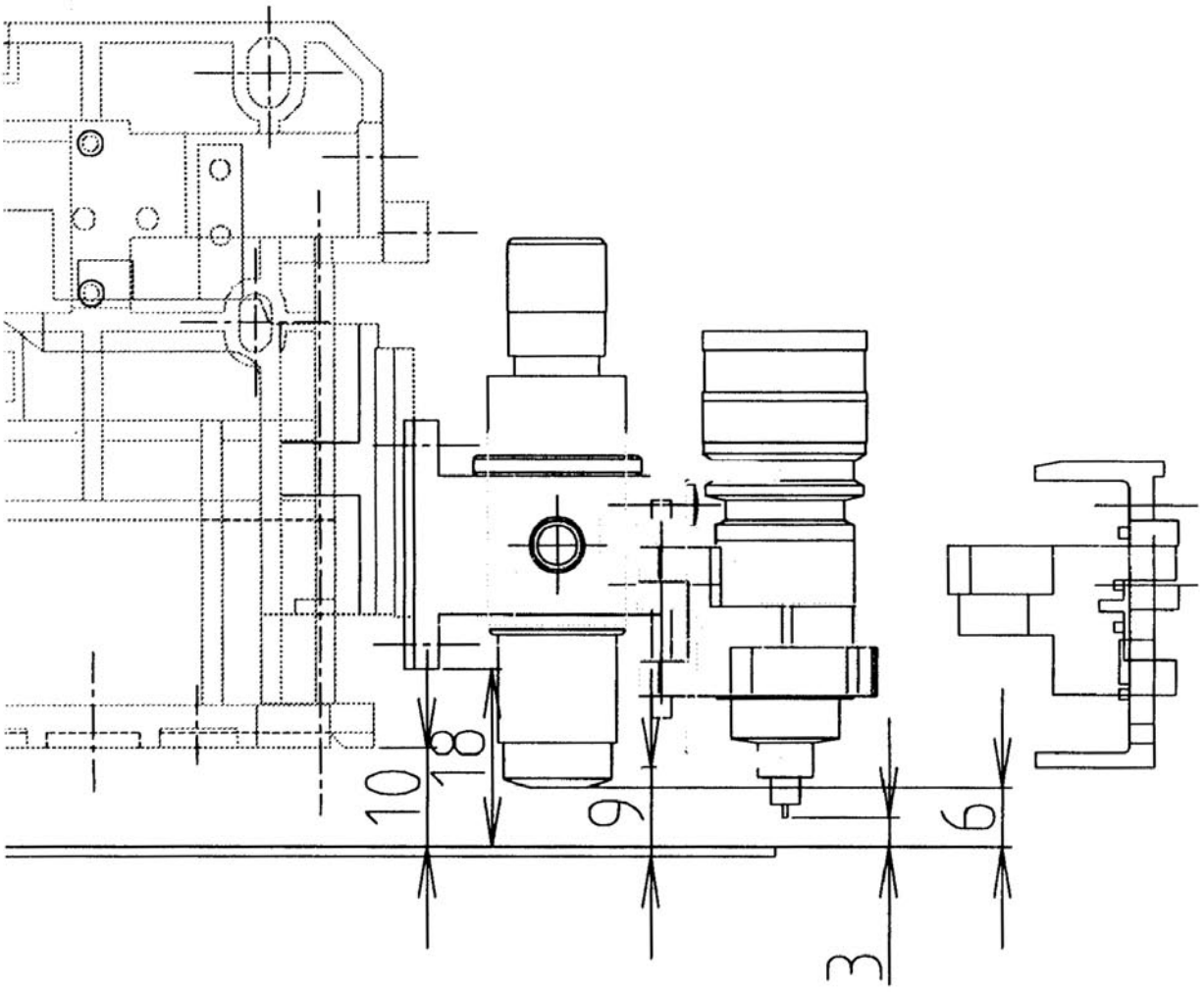
FC4210-60



6.11 Adjusting the Pen Block Height

The Pen Block height needs be adjusted when attaching a Pen Block.

Position the Pen Block within 10 mm (10.5 mm for FC4210-60) from the Writing Panel to the bottom of the Pen Block.



6.12 Adjusting the X Belt Tension

Move the Y Rail toward the home side stopper (left side of the main unit).

Press the belt downward at the middle part of the X Rail (where a screw hole is opened), and at the position where the belt is in contact with the X Rail, adjust the X belt tension to the following values:

FC4200-50: 500 ± 25 gf

FC4200-60 / FC4210-60: 300 ± 25 gf

Apply suitable quantity of the silicon grease to the X belt when you replace to new one.

6.13 Adjusting Y Belt Tension

Move the Y Slider toward the upper stopper.

Press the rail-side belt at the middle part of the Y Rail, and at the position where the belt is in contact with the Y Rail, adjust the Y belt tension to the following values:

FC4200-50: 600 ± 20 gf

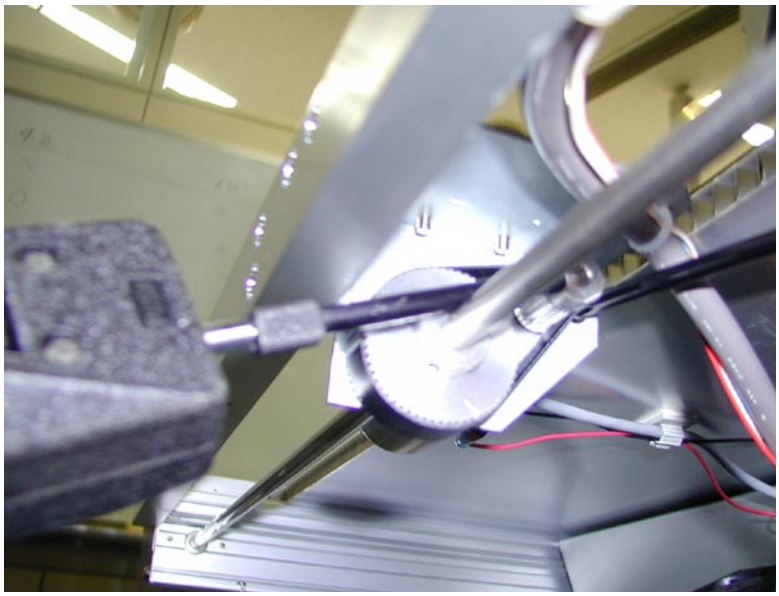
FC4200-60 / FC4210-60: 450 ± 20 gf

Apply suitable quantity of the silicon grease to the Y belt when you replace to new one.

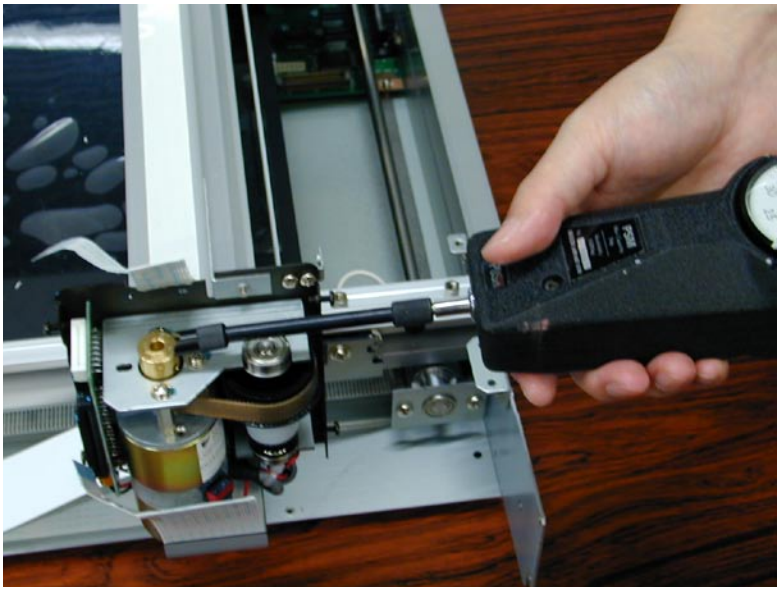
6.14 Adjusting the X and Y Motor Synchro Belt Tension

For both X and Y motors of the FC4200-50 / 60 and FC4210-60, adjust the synchro belt tension to 2.0 ± 0.2 kgf.

X motor

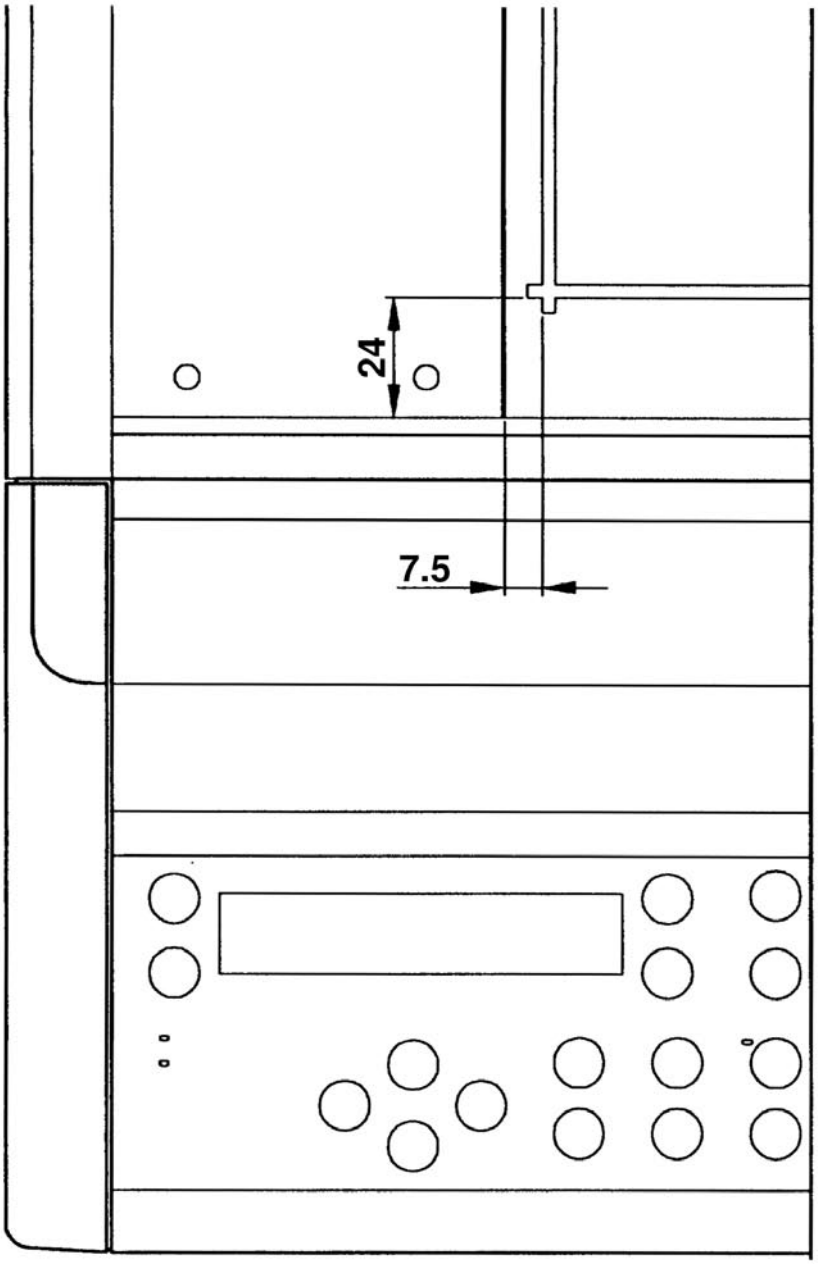


Y motor



6.15 Setting the Origin Position (FC4200-50)

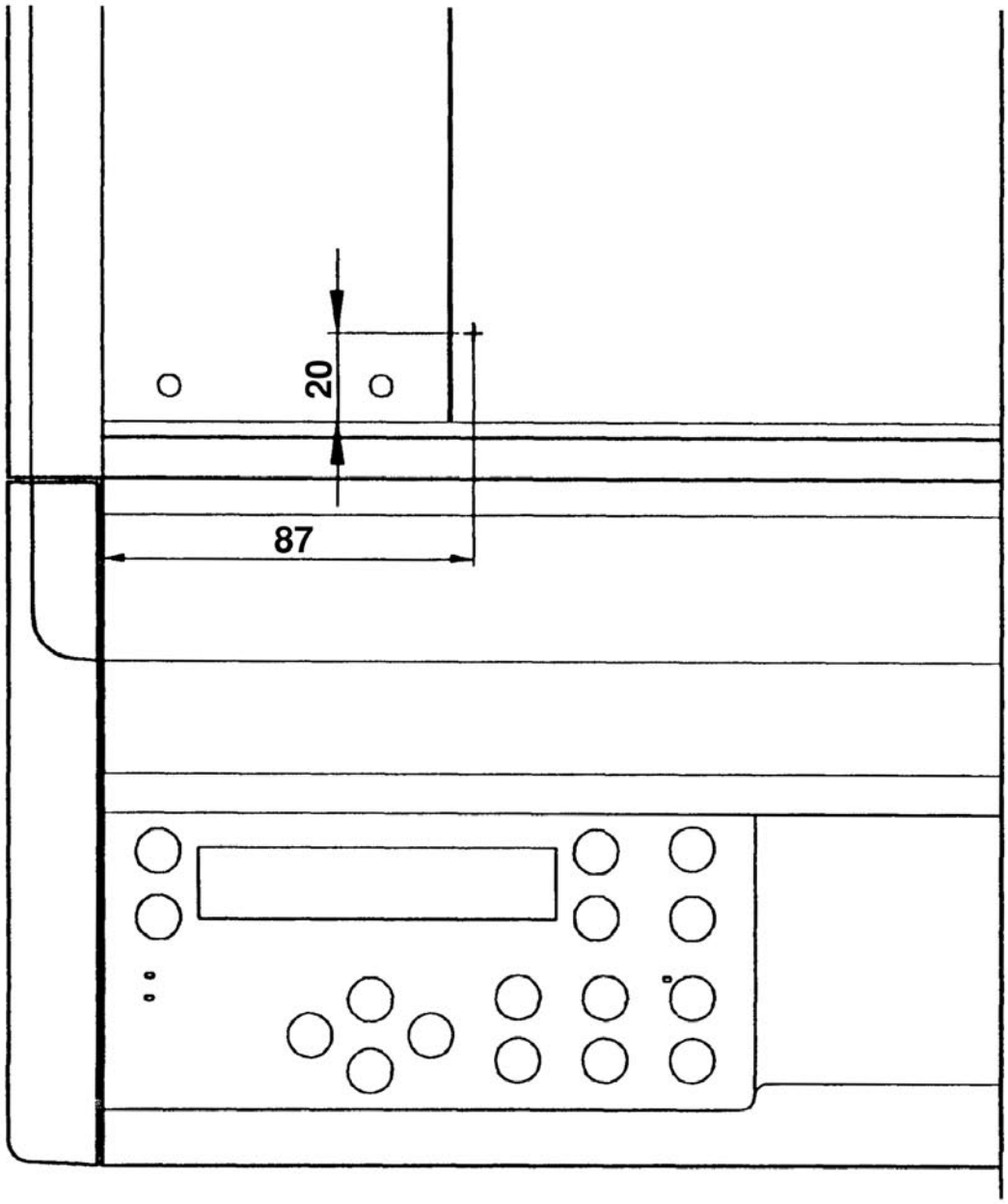
Adjust the drawing origin to a position (7.5 mm, 24 mm) from the printing lines of the electrostatic adhesion panel.



To set the origin (or home position), follow the procedure in Section 7.8, “Adjusting the Home Position.”

6.16 Setting the Origin Position (FC4200-60)

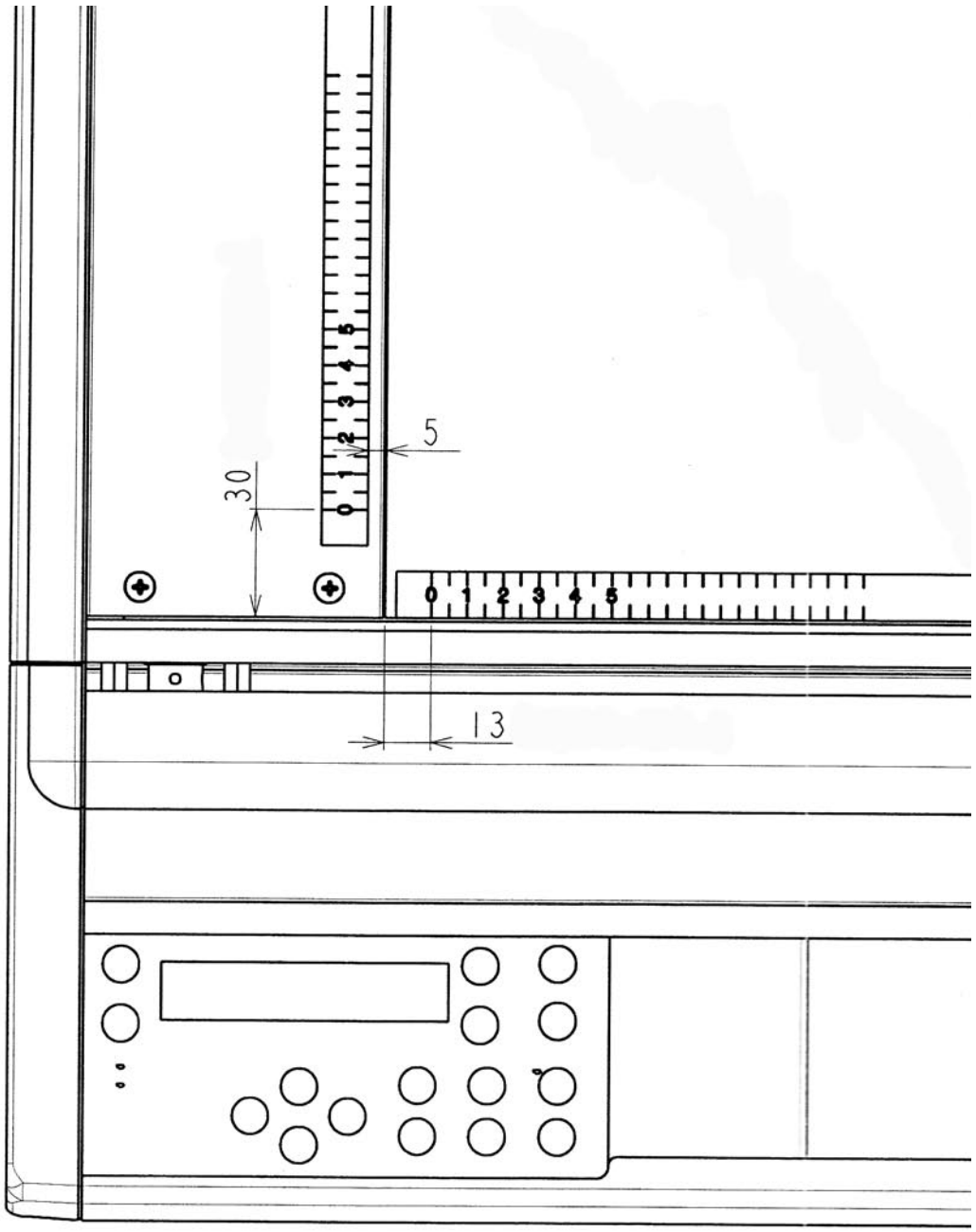
Adjust the drawing origin to a position (87 mm, 20 mm) from the left edge of the XR rail.



To set the origin (or home position), follow the procedure in Section 7.8, “Adjusting the Home Position.”

6.17 Setting the Origin Position (FC4210-60)

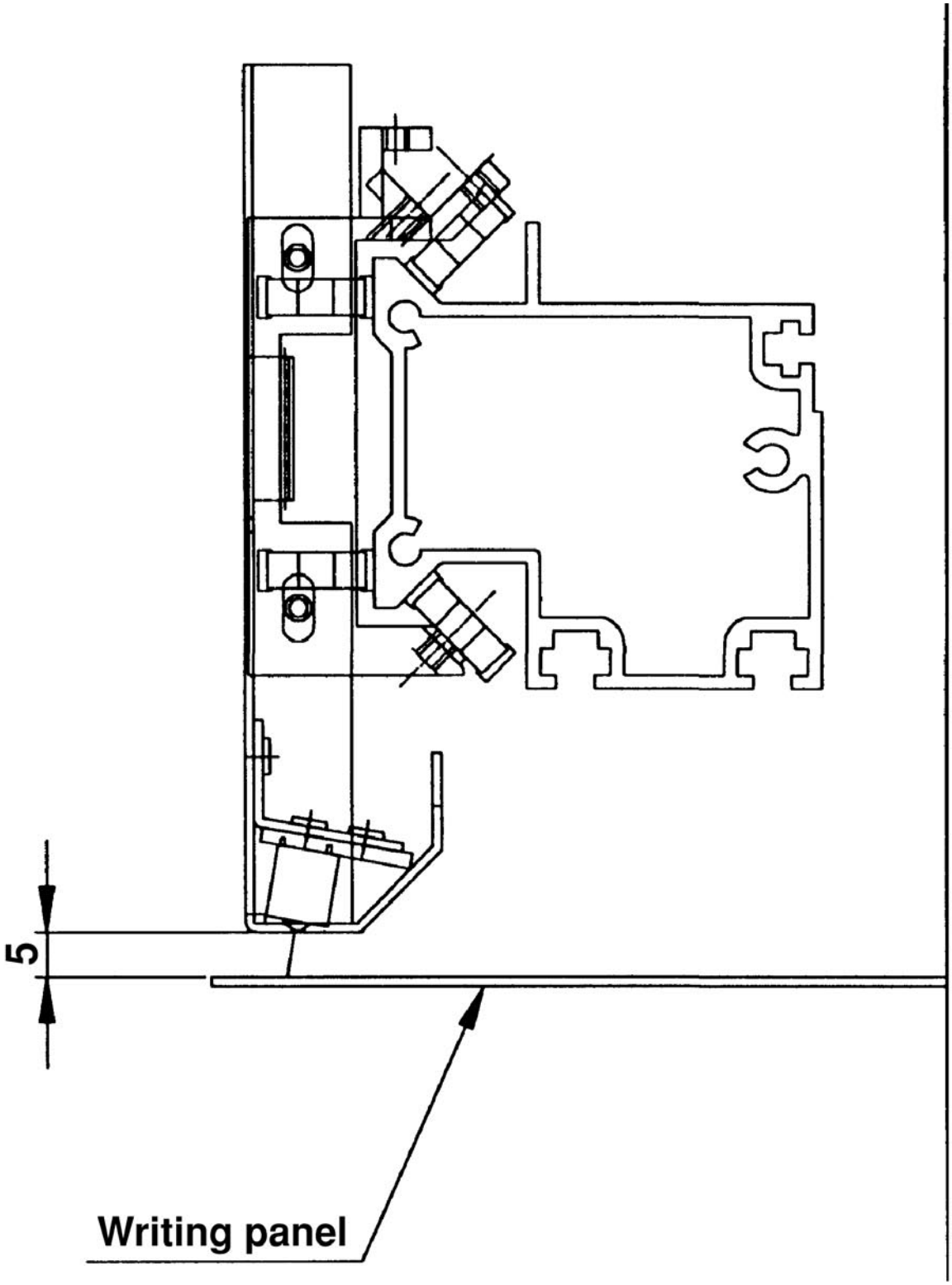
Adjust the drawing origin to a position (13 mm, 20 mm) from the bottom left edge of the writing panel.



To set the origin (or home position), follow the procedure in Section 7.8, “Adjusting the Home Position.”

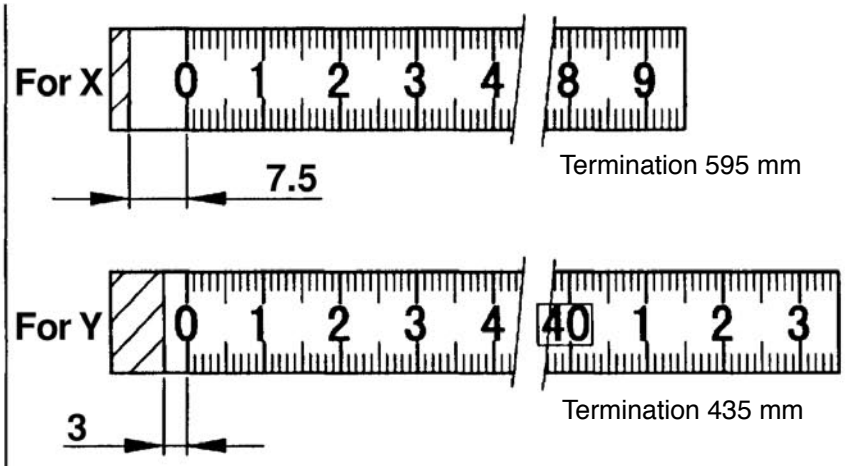
6.18 About the Position of the Register Sensor Height

Adjust the sensor height from the sensor edge to the writing panel to 5 mm.



6.19 Measure Seal Pasting Position (FC4200-50)

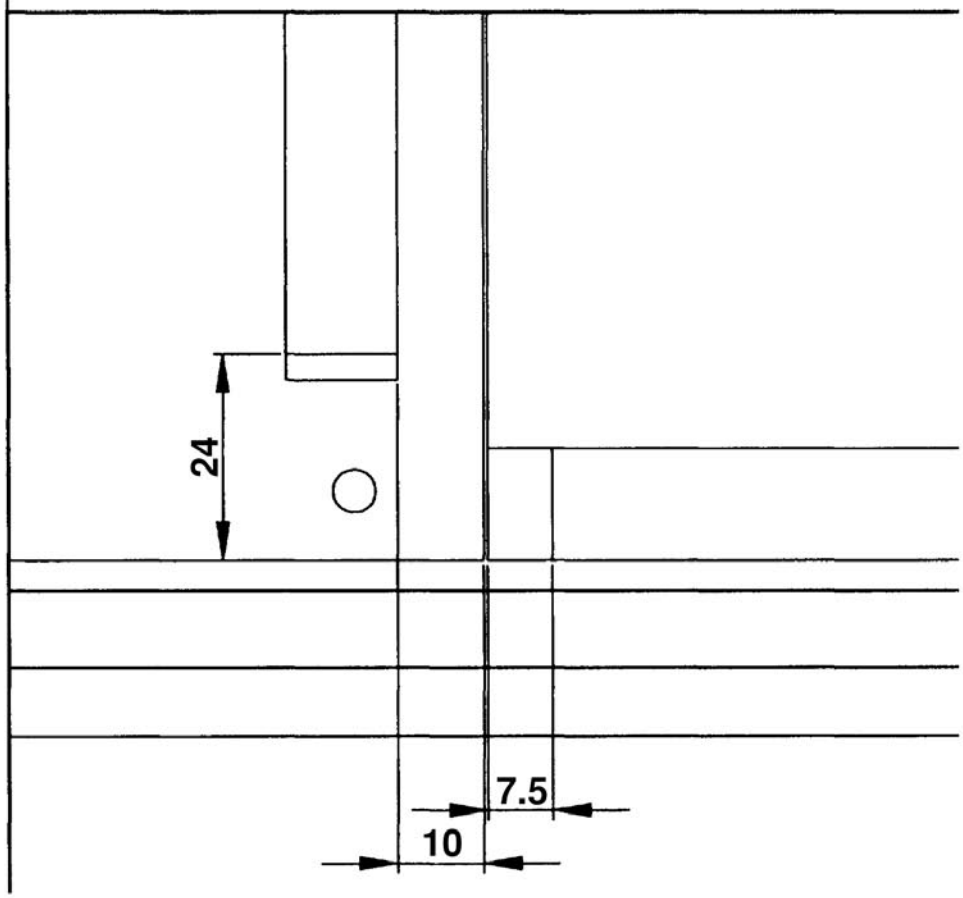
Cut the measure to the length shown below and paste the cut measure into place.



Pasting

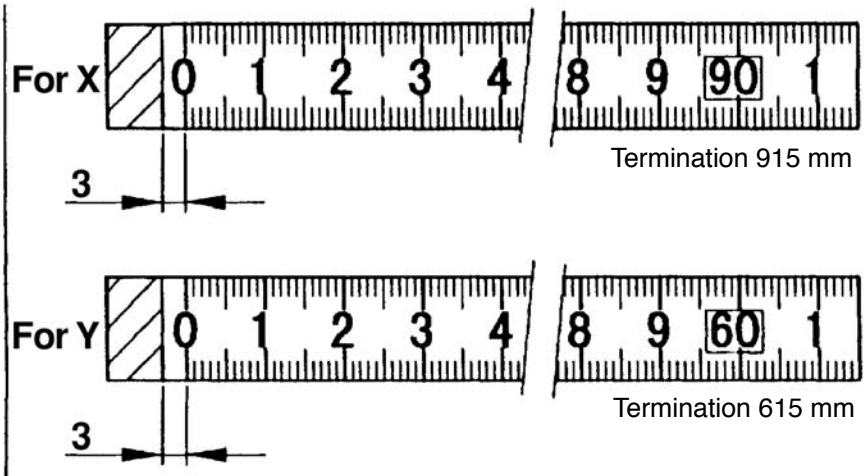
X: Paste the measure at the position at which the 0 on the measure is set 7.5 mm from the honeycomb edge along the X-axis, and the measure is vertically aligned with the honeycomb edge.

Y: Paste the measure at the position at which the 0 on the measure is 24 mm from the honeycomb edge vertically, and distance along the X axis is 10 mm from the edge of Panel L.



6.20 Measure Seal Pasting Position (FC4200-60)

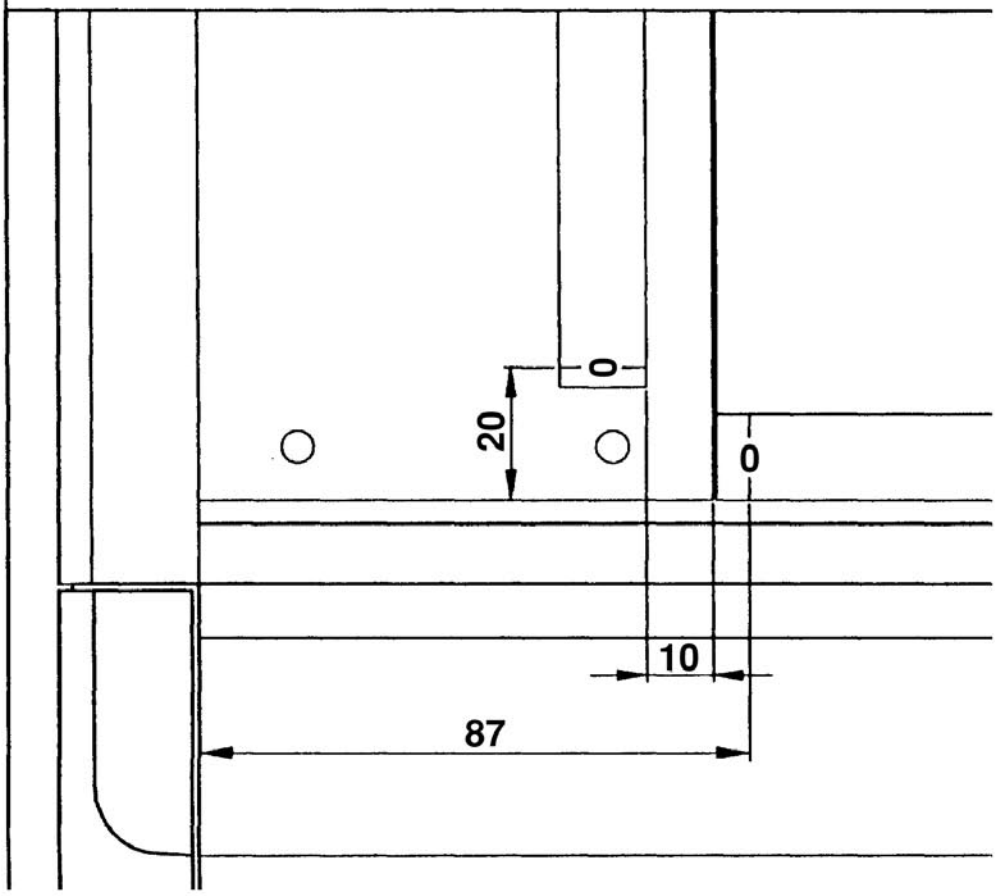
Cut the measure to the length shown below, then paste it into place.



Pasting

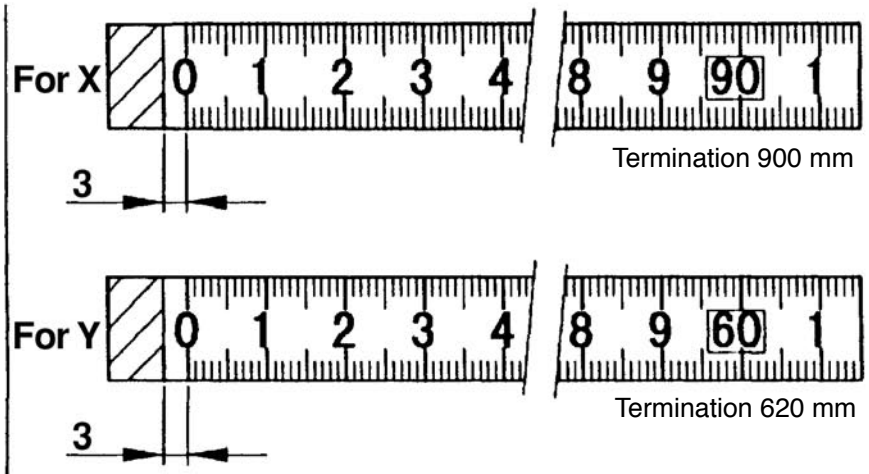
X: Paste the measure at the position at which the 0 on the measure is 5 mm from the left edge of the X Rail along the X-axis, and the measure is vertically aligned with the honeycomb edge.

Y: Paste the measure at the position at which the 0 on the measure is 20 mm from the honeycomb edge vertically, and the distance along the X-axis is 10 mm from the edge of Panel L.



6.21 Measure Seal Pasting Position (FC4210-60)

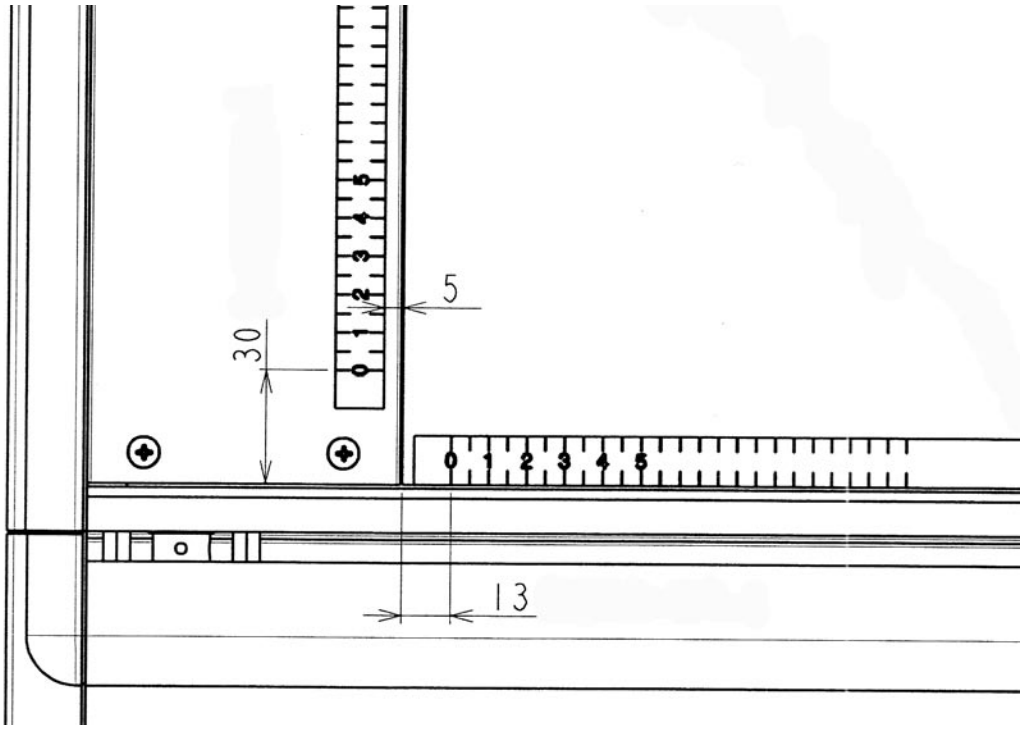
Cut the measure to the length shown below, then paste it into place.



Pasting

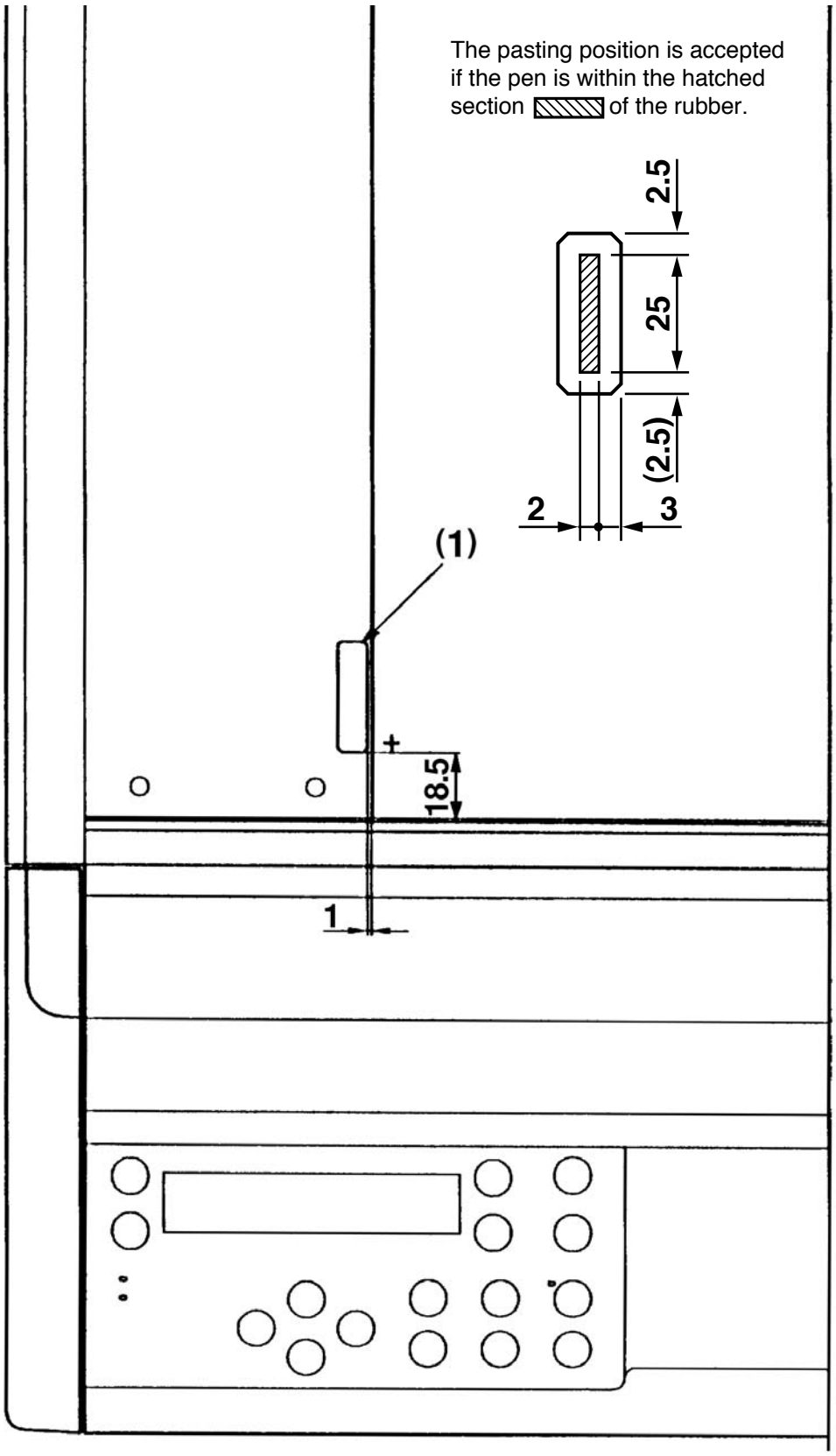
X: Paste the measure at the position at which the 0 on the measure is 13 mm from the left edge of the honeycomb edge the X-axis, and the measure is vertically aligned with the honeycomb edge.

Y: Paste the measure at the position at which the 0 on the measure is 30 mm from the honeycomb edge vertically, and the distance along the X-axis is 5 mm from the edge of Panel L.



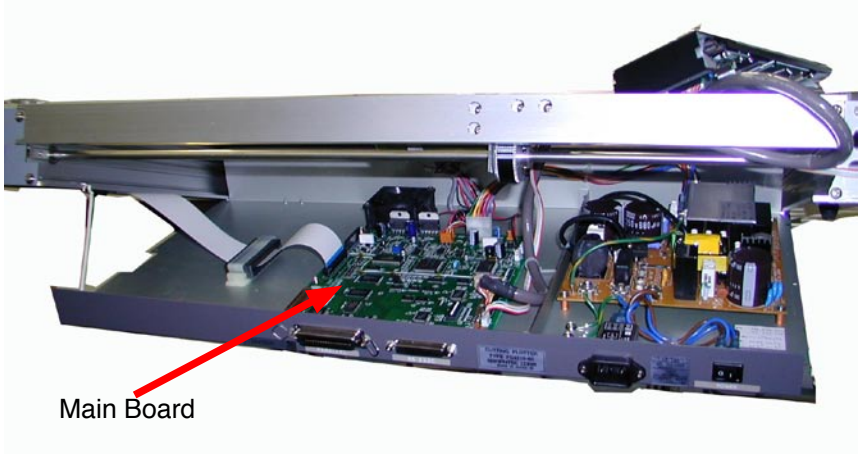
6.22 Pen Sense Rubber Pasting Position (FC4200-50 / -60 only)

Paste (1) Pen Sense Rubber at the position shown below.



6.23 Replacing the Main Board

Open the main control box.



Disconnect all cables from the main board.

Remove the all screws securing the main board.

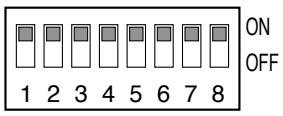
To replace the main board, reverse the above procedure.

Execute the adjustment item of chapter 7-14.

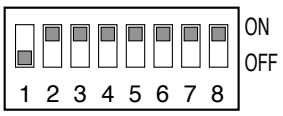
7. ELECTRICAL SECTION

7.1 List of DIP Switches

1. Normal mode (factory settings)

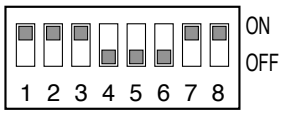


FC4200-60 / FC4210-60

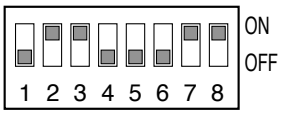


FC4200-50

2. Adjustment mode

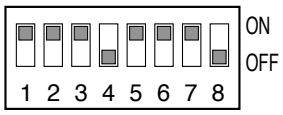


FC4200-60 / FC4210-60

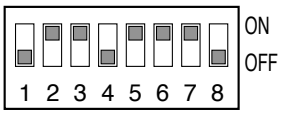


FC4200-50

3. NOVRAM clear



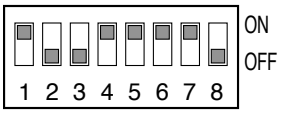
FC4200-60 / FC4210-60



FC4200-50

4. Emergency gain adjustment mode

If gain adjustment resulted in registering an inappropriate value, setting off a position alarm, use this mode to rewrite the gain value.



7.2 Writing to Flash Memory

To update the system frmware you need to have the following files. In addition, you need to use a computer.

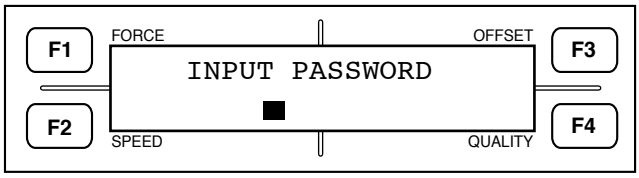
Firmware :FC4200-50 / 60 or FC4210
SEND.EXE :Utillity to transfer files using Windows
SENDB.EXE :Utillity to transfer files using DOS

1. Check that the power supply (J14) and control panel unit (J10) are connected to the main board. Connect a personal computer to the Centronics terminal (J18).

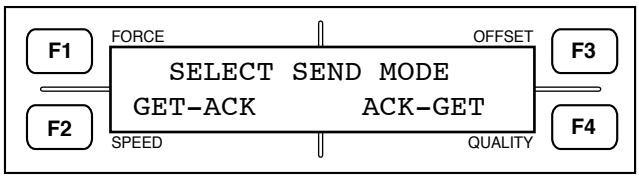
   Caution:
   If you are writing to a new board for the first time, remove the motor and flex cable connectors before performing the write.

2. Set the DIP switch to “Normal mode” or “Adjustment mode.”

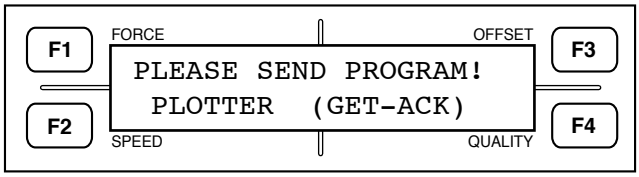
3. Hold down both the “Right” and “Left” POSITION keys while turning on the power. When you hear a short buzzer tone, release the keys. The LCD should display the following:



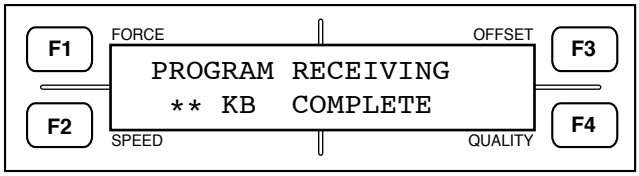
4. Press the POSITION keys in the sequence “Up”, “Down”, “Right” and “Left”. A buzzer will sound, and the LCD will display the following:



Press [F2] or [F4] depending on the type of computer you are using. (Normally, press [F2].)
The display changes to display the following:



5. Transfer firmware data from the personal computer.
   Send frmware to the plotter from the computer.
   Drag and drop the frmware file onto the SEND.EXE icon when using Windows.
   For DOS mode, use SENDB.EXE as shown below.
   (For example: Firmware file name is "v2.40")
   >SENDB v.2.40
   The display changes to display the following:



Number of bytes transferred

   As the firmware data is successfully transferred, the number of transferred bytes shown on the LCD increases. When the transfer finishes, the display automatically changes to “FLASH MEMORY CLEAR” and “FLASH MEMORY WRITE,” and the system begins writing to flash memory.
   Note:
   If you are writing to a new board, the system will automatically perform a NOVRAM clear operation following the write.

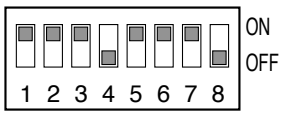
6. Switch off power when you’re done.

7.3 Clearing Non-Volatile RAM

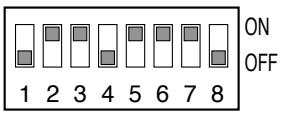
Caution:
Always perform the operation described here when using a new board for the first time. Note that this operation deletes all previously set settings.

A NOVRAM clear is executed automatically after you write firmware to a new board. To execute a separate NOVRAM (that is, not as part of this operation), follow the procedure given below.

Check that the operation unit (J14) and power supply (J10) are connected to the main board. Set the DIP switch as shown below and switch on power.



FC4200-60 / FC4210-60

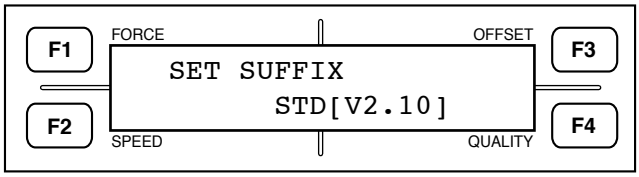


FC4200-50

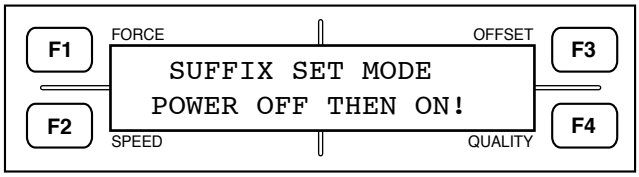
1. The LCD displays the following screen, and the system begins initializing the NOVRAM.

(The PROMPT lamp flashes as initialization proceeds.)

2. The system proceeds to write the initial values to the NOVRAM.



3. The following appears when initialization is complete.

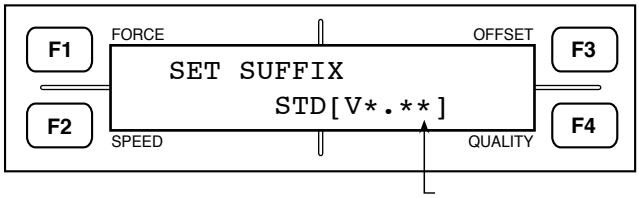


4. Switch off power.

7.4 Setting Suffix

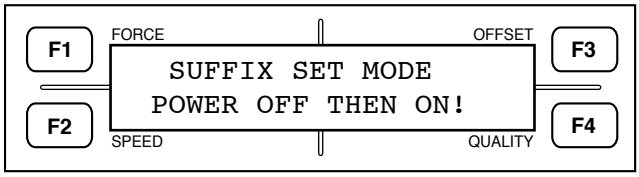
When you first switch on power after performing a NOVRAM clear, a suffix setup screen opens.

1. Set the DIP switch to adjustment mode (or normal mode) and switch on power.
2. The LCD displays the following:



Firmware version

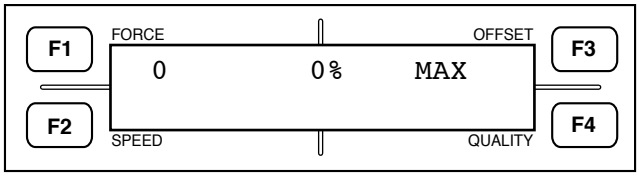
3. Press the F4 key to change the suffix display. Adjust to the one specified upon shipment before pressing the Enter key.
4. The LCD displays the following. After confirming this display, switch off power.



7.5 Adjusting the Mark Sensor Level

Correctly connect the connectors for all wire materials before performing the operation described below.

1. Set the DIP switch to adjustment mode (or normal mode).
2. Hold down the POSITION keys “Left” and “Lower” while switching on power. The LCD displays the following:



3. Place white paper for adjustment use on the panel, making sure that no part of it is raised above the surface. Move the mark sensor by hand to the position exactly above the paper. The bar graph shown in the lower row of the LCD will indicate, as a percentage value, the amount detected of reflected sensor light. On the main board, turn VR1 clockwise or counterclockwise to adjust the indicated value in the range 27–30%.
4. Switch off power.

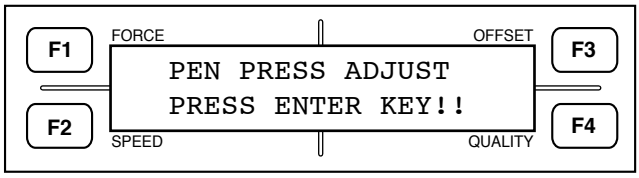
7.6 Adjusting the Pen Pressure

Required jigs and tools
- Collet gauges (500 g, 300 g, 50 g)
- Cutter plunger

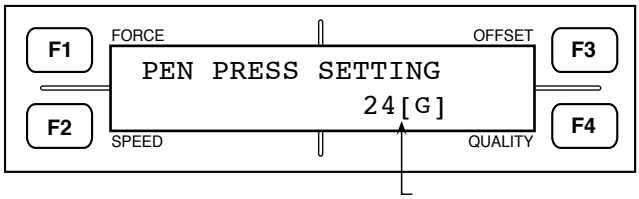
1. Check that the carriage cover is in place. Fit the cutter plunger from which the blade has been removed into the cutter holder.

2. Set the DIP switch to adjustment mode and switch on power.

3. Hold down the [Next Page] key until the LCD displays the following:

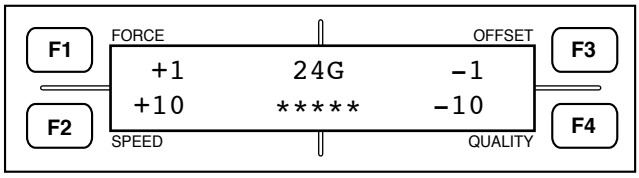


4. Press the [Enter] key. The LCD display changes to display the following:



Use F4 key to change

5. Press the [Enter] key. When the LCD screen changes to display the following, measure the pen pressure with a collet gauge. Use the [F1] through [F4] keys to adjust pen pressure until the pressure is within 24 ± 1 g. After adjustment, press the [Enter] key to go to the next step.
   Target pen pressure
   [F1] key: Increases pen pressure by a small amount. [F3] key: Reduces pen pressure by a small amount.



Correction value

   [F2] key: Increases pen pressure by a large amount. [F4] key: Reduces pen pressure by a large amount.

6. Next, when the LCD display changes to a 210 g setup screen, adjust the pen pressure to within 210 ± 10 g in the same way as described above.

7. Finally, on a 400 g setup screen, adjust the pen pressure to within 400 ± 20 g.

8. You will have the 2nd pen pressure adjustment menu when you are adjusting for the FC4210-60. Adjust the 2nd pen pressure by same as the 1st pen pressure adjustment manner.

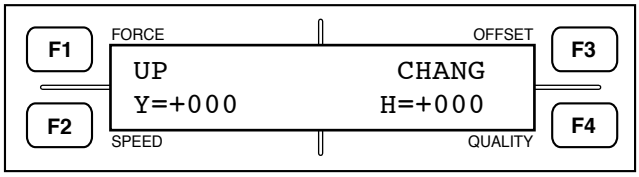
9. Following adjustment, the LCD display returns to the 24 g screen. At this screen, press the [Next Page] key to make the next adjustment.

7.7 Adjusting Pen Exchange (FC4200-50 / 60 only)

1. Set the DIP switch to adjustment mode and switch on power.
2. Hold down the [Next Page] key until the LCD displays the following:

3. Attach pens to the pen station.
4. Press the [Enter] key. The LCD display changes to display the following:

Modify the correction value Change pens



Move the cursor to the left Move the cursor to the right

Thrust amount adjustment value Pen exchange height adjustment value

5. Press the [F3] key to prompt the plotter to perform a pen exchange and pen placement operations. Adjust the Y and H values until the plotter can execute pen exchange and pen placement operations normally.

   To move in the reverse direction, decrement the Y value.
   To move in the thrust direction, increment the Y value. (Y is expressed in increments of 0.1 mm.)

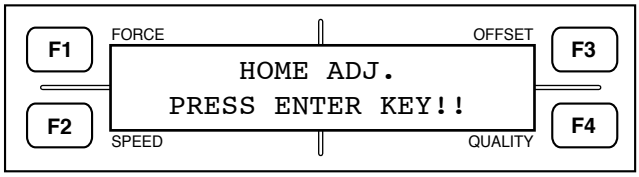
   To raise the pen holder, decrement the H value.
   To lower the pen holder, increment the H value. (H is expressed in increments of 0.1 mm.)

   Note:
   Hold down the [F3] key as the plotter begins moving to get access to a pen. This causes the plotter to stop, allowing you to easily check the pen height.

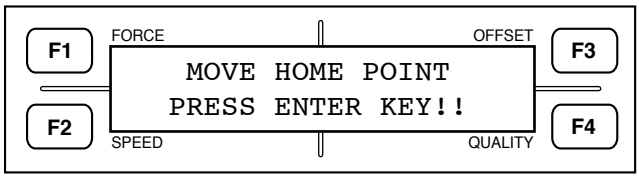
6. If the plotter has no problems changing pens, press the [Enter] key to finish.
7. Switch off power, or proceed to the next adjustment.

7.8 Adjusting the Home Position

1. Set the DIP switch to adjustment mode and switch on power.
2. Hold down the [Next Page] key until the LCD displays the following:



3. Press the [Enter] key. The plotter starts reading the home sensor. The LCD screen will switch to display the following:



4. Attach a pen-type magnifier to the cutter holder, and move to the home position using the position key. After confirming the position, press the [Enter] key.

   Note:
   For more information on the mechanical dimensions of the home position, see the mechanism manufacturing specifications.

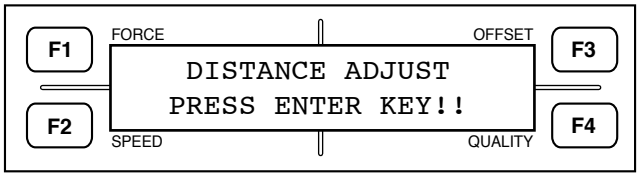
5. The plotter starts reading the home sensor again and returns to the display in 3. If the position is good, press the [Enter] key to finish.
6. Switch off power, or proceed to the next adjustment.

   Reference:
   This adjustment does not affect the plotter's pen exchange adjustment.

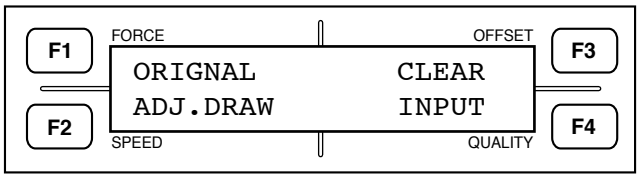
7.9 Adjusting the Distance Accuracy

1. Set the DIP switch to adjustment mode and set micro trace. Attach a ceramic pen to the cutter holder and switch on power.

2. Hold down the [Next Page] key until the LCD displays the following:

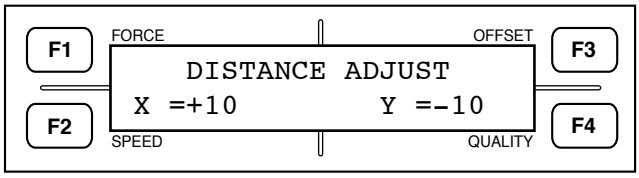


3. Press the [Enter] key. The LCD display changes to display the following:



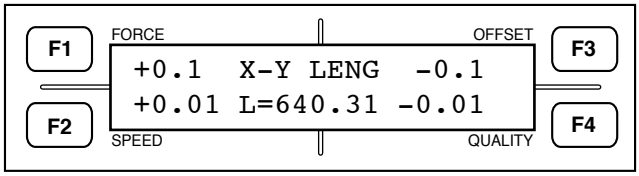
F1: Plots a distance adjustment pattern before distance adjustment.
F2: Plots a distance adjustment pattern after distance adjustment.
F3: Clears the set value for distance adjustment.
F4: Goes to a distance adjustment value input screen.
Select F1 to draw a distance adjustment pattern. After removing the paper, measure the lengths of X and Y reference lines and diagonal lines.

4. Select F4 to switch to a distance adjustment value input screen.



Enter differences in increments of 0.1 mm relative to X = 500 mm and Y = 400 mm.
F1: Increments the X axis difference value by 0.1 mm
F2: Decrements the X axis difference value by 0.1 mm
F3: Increments the Y axis difference value by 0.1 mm
F4: Decrements the Y axis difference value by 0.1 mm
* If the measured value is smaller than the reference value, enter a positive value.

5. After setting the values, press the [Enter] key. The LCD screen will switch to an X-Y length adjustment input screen.



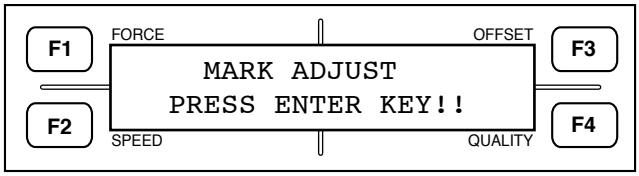
Enter the measured values of diagonal lines using F1 through F4. Press the [Enter] key to confirm the values you've entered.

6. Attach the paper again and press the [F2] key to draw a post-adjustment pattern and verify distance accuracy.

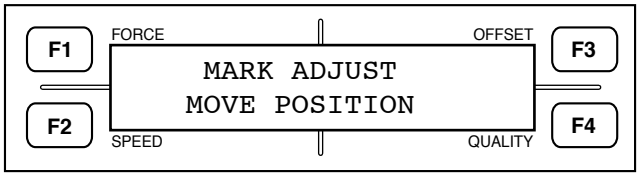
7. When the adjustment is complete, press the [Next Page] key to finish.

7.10 Adjusting the Mark Sensor Mechanical Position

1. Place a sheet of white paper on the panel, making sure that no part of it is raised above the surface.
2. Set the DIP switch to adjustment mode and switch on power.
3. Hold down the [Next Page] key until the LCD displays the following:



4. Press the [Enter] key. The LCD display changes to display the following:

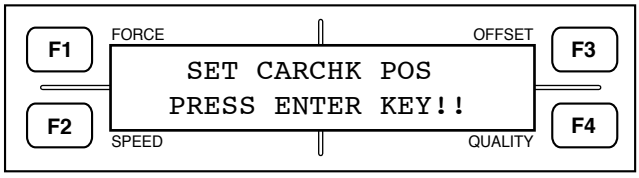


5. Mount a ceramic pen in the pen holder, move the carriage to a blank area of the paper, and press the [Enter] key. The plotter draws a square shape, reads it with a sensor, and corrects the position.
6. When done, switch off power, or perform the next adjustment.

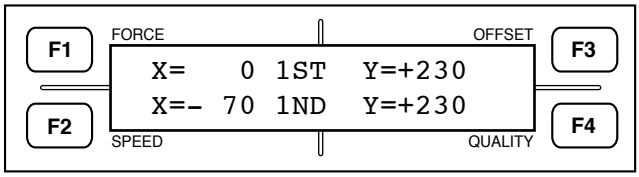
7.11 Verifying the Carriage Check Position (FC4200-50 / 60 only)

1. Set the DIP switch to adjustment mode and switch on power.

2. Hold down the [Next Page] key until the LCD displays the following:



3. Press the [Enter] key. The LCD display changes to display the following:



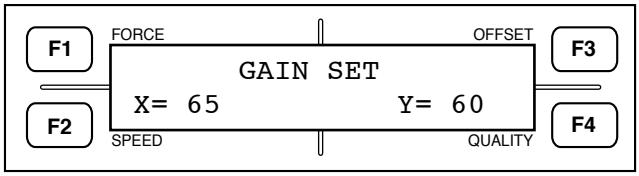
   The values shown here indicate the position to which the plotter moves as it performs carriage pen check operations. This is a two-step operation; after retracting to the “1st” position, the plotter performs a pen-down operation at the “2nd” position.

4. Press the [TEST] key to prompt the plotter to perform a carriage pen check operation. Check that the No. 1 and No. 2 pens both are placed almost at center of the rubber plate.
   If the pens are not at the center of the rubber plate, their positions can be adjusted as described below.
   (1) Select the item you want to modify, using keys [F1] through [F4].
   (2) Modify the value using the position keys [Up] or [Down]. The value here indicates a coordinate position in increments of 0.1 mm.
   (3) Press the [Enter] key to confirm the value you’ve set.

5. Press the [Next Page] key to finish.

7.12 Adjusting the Gain

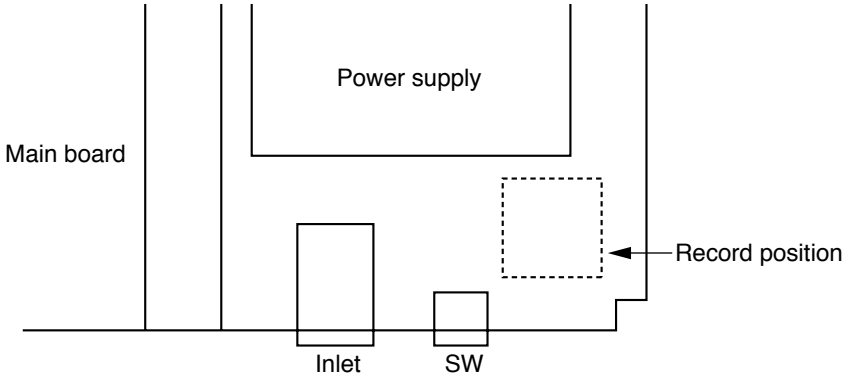
1. Set the DIP switch to normal mode.
2. Hold down the [Left] position key while switching on power.
3. After an initialization operation, execute a gain adjustment program from the personal computer. The LCD displays the following:



4. Adjust the gain until MAX ERROR is equal to or less than 7.
   [F1]: Increases the X gain. [F3]: Increases the Y gain.
   [F2]: Reduces the X gain. [F4]: Reduces the Y gain.
   After adjusting the gains, press the [Enter] key and confirm that a beeper sounds.
5. If NG, check the X and Y motor belt tension and repeat the gain adjustment from the beginning.
6. If OK, switch off power.

7.13 Recording Adjustment Data

After completing the adjustment work, record the adjusted values at the position in the electrical box shown below.



The contents of an example record are shown below.

88, 308, 562	Pen pressure adjusted values
84, 305, 559	2nd Pen pressure adjusted values (FC4210-60 only)
Y = +4, H = 0	Pen exchange adjusted values
X = +10, Y = 0	Distance accuracy adjusted values
X = 65, Y = 60	Gain adjusted values

7.14 List of Readjustment Items

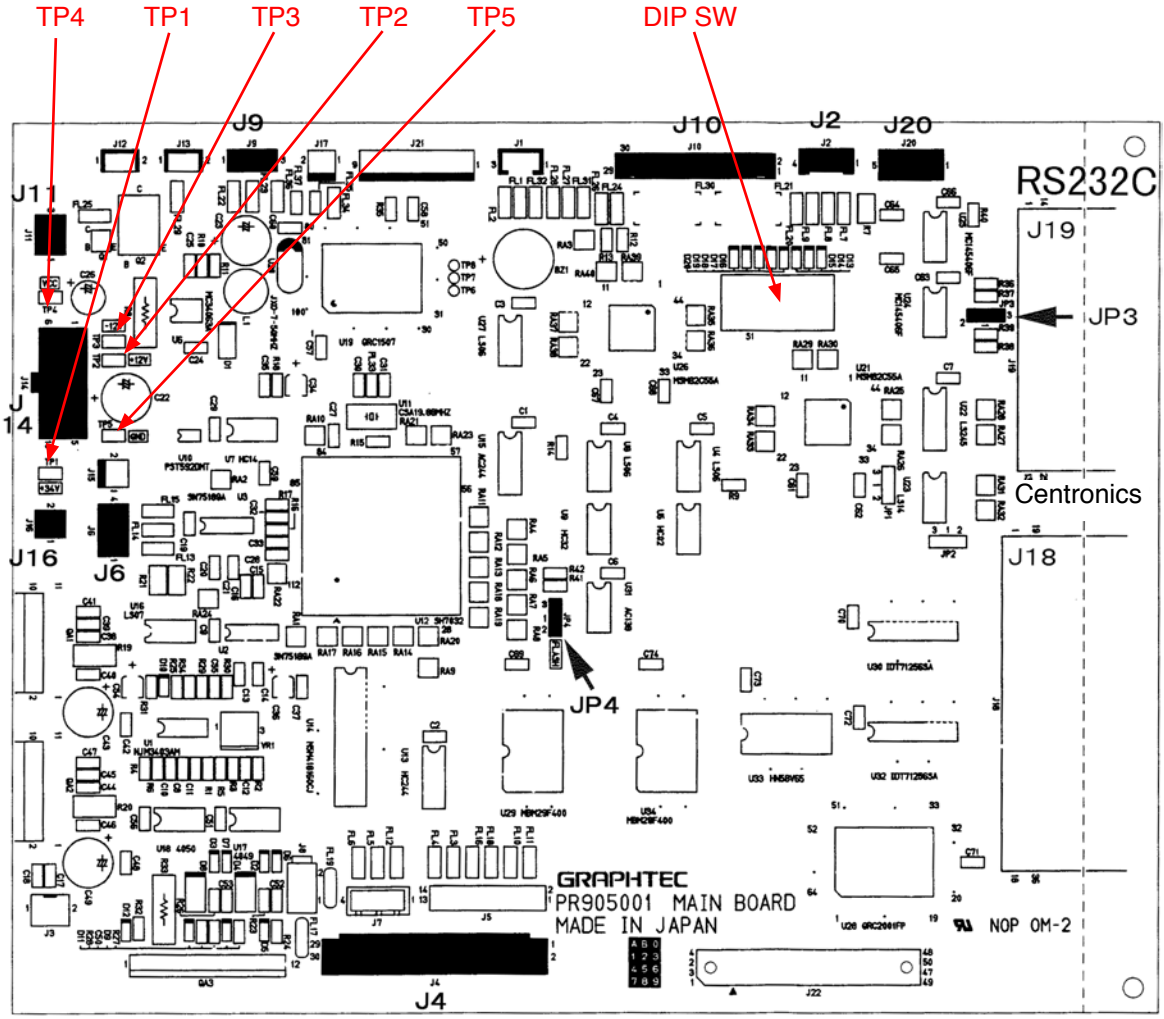
If you replaced one of the units listed in the table below or altered their sensor positions, be sure to readjust the corresponding items.

Unit name / Item	Main board Note 1	Pen relay board	X home sensor	Mark sensor	Pen block	XY motor	XY timing belt replacement
Flash memory write	△						
NOVRAM clear	○						
Mark sensor level adjustment	○			○			
Pen pressure adjustment	○				○		
Pen exchange adjustment (Except FC4210-60)	○	○			○		
Home position adjustment	○	○	○		○		
Distance accuracy adjustment	○						
Carriage check position verification (Except FC4210-60)	○	○	○		○		
Mark sensor mechanical position adjustment	○	○		○	○		
Gain adjustment	○					○	○
Belt tension adjustment						○	○

No mark: Unnecessary ○: Must always be adjusted △: To be adjusted as necessary

Note 1:
The main board must have the latest version of firmware unless otherwise specified.

7.15 Location of Parts on the Main Board



Checking Voltage Levels

The output voltage levels

Main Board

Pin No.	Output valtage	Permissible range
TP1	+34V	+33.5V to +34.5V
TP2	+12V	+11.5V to +12.5V
TP3	-12V	-11.5V to -12.5V
TP4	+5V	+4.9V to +5.1V
TP5	GND	0V

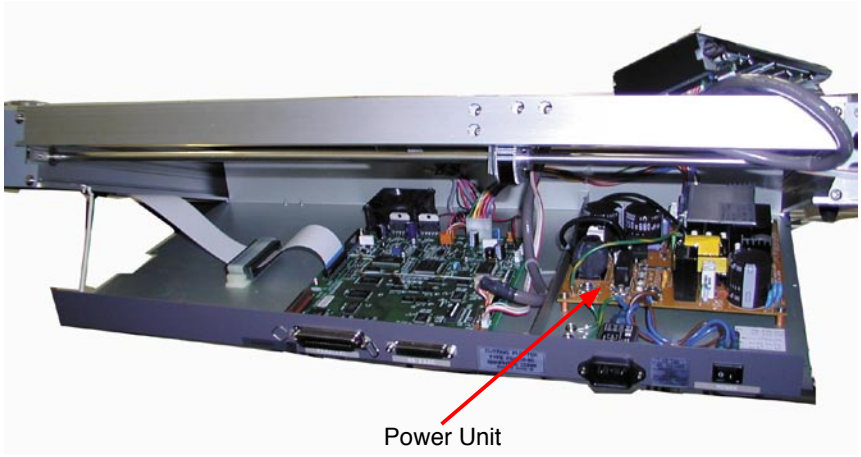
7.16 Setting the Power Unit's Supply Voltage (PS089B)

If your plotter has the PS089B power supply board then perform following procedure.

The LEP100F-36 power supply board doesn't need to set the power unit's supply voltage.

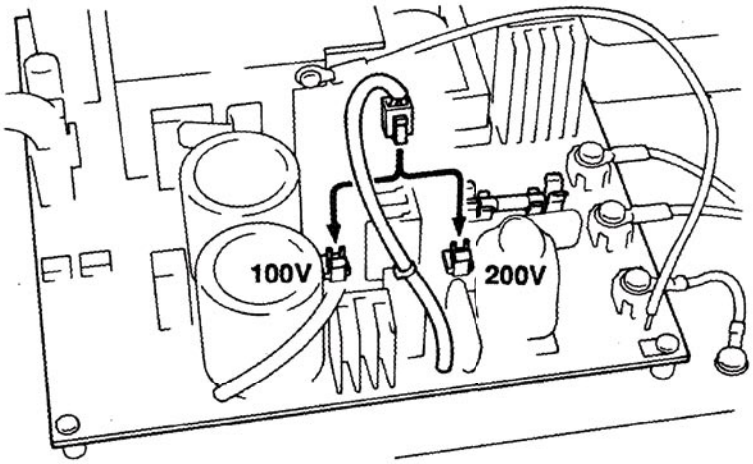
(1) Check that the plotter's POWER switch is off.

(2) Open the chassis of the Main Control Box.



(3) Connect the power unit's cable to the required connector.

Voltage series	Corresponding area	Connector
100 V	JAP 110T/K WGI117UL	CN2
200 V	CEE SEV BS AS	CN3



8. TEST MODES

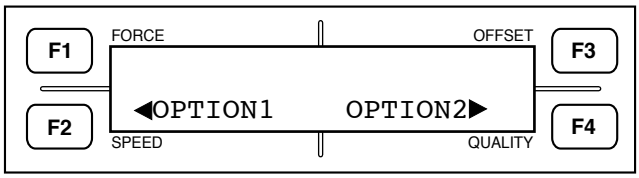
8.1 Printing a List of the Currently Selected Conditions

Caution:
As soon as the F2 (COND. PAT.) key is pressed to select this function in Step (4) below, the pen carriage begins moving. Be sure to keep hands, hair, and so forth away from the plotter's moving parts.

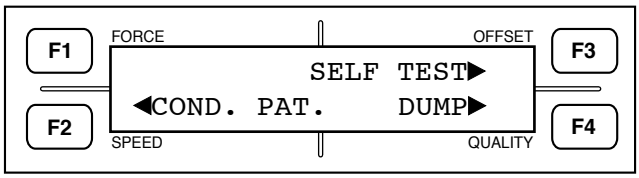
The PRINT CONDITION function prints a list of the plotter's currently selected conditions so you can check them all at once.

Setting Procedure

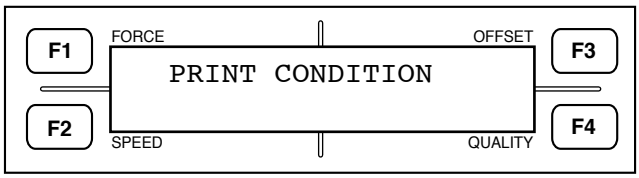
1. Load a medium of A4 size or larger in the plotter.
2. Press the PAUSE key, then press the NEXT PAGE key until the menu below appears.



3. Press the F4 (OPTION2) key to display the menu below.



4. When the F2 (COND. PAT.) key is pressed, the menu below appears and the plotter begins printing a list of its currently selected conditions.



5. After the conditions have been printed, the plotter resumes READY status.

8.2 Running the SELF TEST

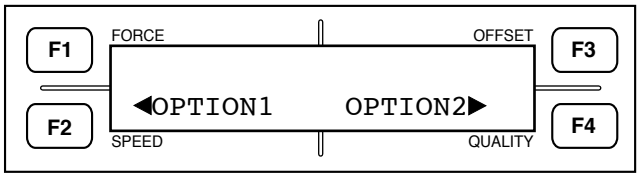
Caution:

As soon as the F3 (SELF TEST) key is pressed to select this function in Step (4) below, the pen carriage begins moving. Be sure to keep hands, hair, and so forth away from the plotter's moving parts.

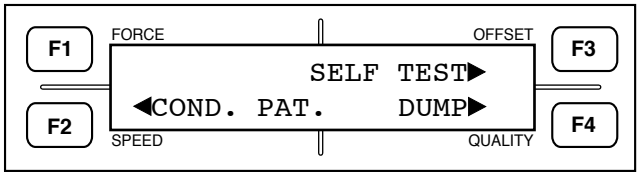
The SELF TEST function prints a test pattern that allows you to check the plotter's operation independent of its interface functions.

Setting Procedure

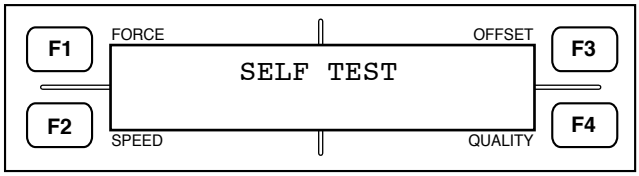
1. Load a medium of A3 size or larger in the plotter.
2. Press the ▮▮ PAUSE key, then press the NEXT PAGE key until the menu below appears.



3. Press the F4 (OPTION2) key to display the menu below.



4. When the F3 (SELF TEST) key is pressed, the menu below appears and the plotter begins plotting the self test pattern.



5. The plotter repeatedly plots the self test pattern until it is turned off. To terminate the self test, therefore, turn off the plotter.

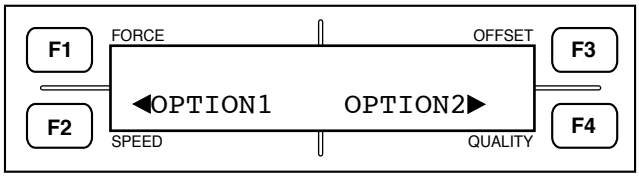
8.3 Using the Character Dump Mode

Caution:
As soon as the F4 (DUMP) key is pressed to select this function in Step (4) below, the pen carriage begins moving. Be sure to keep hands, hair, and so forth away from the plotter's moving parts.

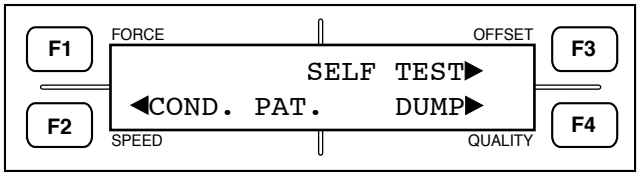
This CHAR DUMP function enables advanced users to check whether or not the plotter is properly receiving the data sent from the computer. If the data printed by the CHAR DUMP function does not match the data actually sent from the computer, check your RS-232C interface conditions or COMMAND setting once more. These settings may be incorrectly set or may not match your software application's settings.

Setting Procedure

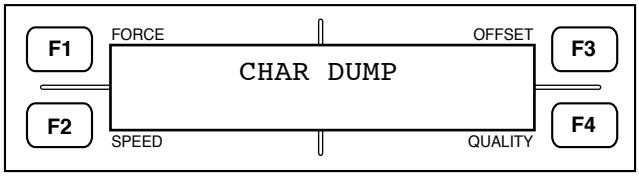
1. Load a medium of A4 size or larger in the plotter.



2. Press the PAUSE key, then press the NEXT PAGE key until the menu below appears.



3. Press the F4 (OPTION2) key to display the menu below.



4. When the F4 (DUMP) key is pressed, the menu below appears and the plotter enters DUMP mode.
5. When you send data from the computer to the plotter, the plotter begins printing that data.
6. To exit the DUMP mode, turn off the plotter.

Note:

- In DUMP mode, the plotter prints the data it receives as ASCII codes. Control codes are printed in smaller characters as two-digit hexadecimal values.
- In response to the receipt of a READ-type command, the plotter sends back dummy data except when requested to output its current status.

9. TROUBLE SHOOTING

If your plotter is not operating properly, try the solution(s) described in the following tables before contacting your sales representative or nearest Graphtec vendor to request a service call.

9.1 The Plotter Doesn't Operate After Being Turned On

Symptom	Cause	Solution
The control panel's POWER lamp does not light. The display panel is blank.	The plotter isn't being supplied with power.	Check that the power cord is properly plugged into the plotter's AC inlet and the electrical outlet.
The POWER lamp lights but the plotter doesn't operate.	The plotter has broken down.	Replace the power supply unit. Replace the main board.
The control panel's POWER lamp lights, but the plotter doesn't operate. The control panel's PAUSE lamp is flashing. The display panel is blank.	The ROM and RAM are defective.	Replace the main board.
The control panel's POWER lamp lights, but the plotter doesn't operate. The "Sum-ck-ROM ERROR!!" message appears on the display panel.	The ROM and RAM are defective.	Replace the main board.

9.2 The Cut Results Are Unsatisfactory

Symptom	Cause	Solution
• The cut corners are too round • The cut corners are too pointed	The OFFSET setting is not suitable for the blade type being used.	Adjust the OFFSET setting. ➡ Corners are too rounded: Raise the OFFSET value. ➡ Corners are too pointed: Lower the OFFSET value
The cutter blade wobbles only when it starts to cut	The blade does not rotate smoothly in the holder.	Remove any foreign matter in the holder.
	The OFFSET FORCE setting is too low.	Raise the OFFSET FORCE setting. * The cutter pen's OFFSET FORCE and the cutting FORCE are two different functions.
	The spring has come loose from the CB09UA blade.	Replace the blade with a new one equipped with a spring.
• Solid lines are cut as dotted lines (the blade skips). • The cutter blade seems to undulate when cutting solid lines.	The cutter's blade is extended too far.	Adjust the extended length of the cutter's blade.
	The cutting speed is too fast.	Lower the SPEED setting to reduce the cutting speed.
Curved lines become zigzagged.	The software application's cutting data is too coarse.	Rewrite the software application's cutting data to specify more coordinate points for smoother curves.
	The OFFSET ANGLE setting is too low.	Raise the OFFSET ANGLE setting.
• The medium's corners peel off. • The medium peels off when cutting small characters.	The cutter's blade is extended too far.	Adjust the extended length of the cutter's blade.
	The OFFSET setting is not suitable for the blade type being used.	Adjust the OFFSET setting.
	The cutting speed is too fast.	Lower the SPEED setting to reduce the cutting speed.
	The cutter's blade is too dull to cut the medium.	Replace the blade.
	The QUALITY setting is too high.	Lower the QUALITY setting.
• The blade cuts even into the backing sheet.	The cutter's blade is extended too far.	Adjust the extended length of the cutter's blade.
	The cutting FORCE setting is too high.	Lower the FORCE setting.
• The blade falls out of the cutter plunger.	The cutter plunger's diameter is too large for the blade being used.	Use a cutter plunger of the proper diameter for your blade.
• The medium is being cut but remaining scraps are hard to remove.	The retack sheet's adhesion is too weak.	Use a retack sheet with greater adhesive power.
• The processed film cannot be picked up with a retack sheet.	The medium gets entangled where cutting has been performed.	• Retract the extended length of the cutter's blade. • Lower the cutting FORCE setting.
	After processing, the medium was left without promptly peeling off remaining scraps.	Peel off remaining scraps as promptly as possible.

Symptom	Cause	Solution
• The cutter unit generates an abnormal noise during operation. • The medium becomes discolored wherever the blade passes.	The tip of the cutter plunger is rubbing against the medium.	Adjust the extended length of the cutter's blade and the cutting FORCE setting.
• The resulting image is not the specified size.	The software application and plotter are not set to the same STEP SIZE setting.	Specify the same STEP SIZE setting for both your software application and for the plotter.
	Scaling is enabled at your software application.	Check the scaling setting.
• The PROMPT lamp lights when data is output (an off-scale error has occurred) • Certain areas of the medium cannot be cut.	The software application and plotter are not set to the same STEP SIZE setting.	Specify the same STEP SIZE setting for both your software application and for the plotter.
	Computer output to the plotter contains data specifying coordinate points outside of the specified AREA setting.	Re-specify the AREA setting.
	Computer output to the plotter specifies an image that exceeds the effective area.	Rewrite your data to specify a smaller image.
• Cutting conditions cannot be retained or changed.	The CONDITION PRIORITY setting is PROGRAM.	Switch the setting to MANUAL.
	The ENTER key wasn't pressed after changing a setting.	Check your setting procedure.
• Characters and lines become deformed when plotting.	The plotter is set to Cutter mode.	At the CONDITIONS menu, switch the pen type setting from a blade type to PEN.
• The plotter does not cut/plot the specified length (slight error in distance precision).	The DIST. ADJ. function is improperly specified.	Adjust the distance precision.
• Characters become deformed. • Complex images become deformed.	The STEP PASS setting is too high.	Lower the STEP PASS setting.
• The starting and end points of an image do not match.	The cutting data has not been written so that the points meet.	Check your cutting data by plotting it with a pen.
	The OFFSET FORCE setting is too weak.	Raise the OFFSET FORCE setting.
	The medium's backing sheet is too limp.	Switch to a medium with a stiff backing sheet.
	The blade does not rotate smoothly.	Check if any foreign matter has adhered to the blade. If so, remove it.

9.3 The Coordinate Axes Cannot Be Correctly Aligned

Symptom	Cause	Solution
During automatic registration mark alignment, the MARK SEARCH ERROR message is displayed or the coordinate axes cannot be properly aligned.	There is foreign matter or plotting on the area where the mark sensor passes.	Ensure that the detection area is free of foreign matter or plotting.
	The medium is loose or wrinkled where the mark sensor passes.	• Firmly secure the medium so that it will not come loose. • Use a medium without any wrinkles, creases, or folds.
	The medium is not white.	Use a white medium.
	The registration marks are not printed using black ink.	Print the registration marks using black ink.
	The lines of the printed registration marks are too thin or are not cleanly printed.	Print clean registration marks with a line width of at least 0.3 mm.
	Strong light is irradiating the vicinity of the mark sensor.	Ensure that no light from an external source irradiates the vicinity of the mark sensor.
	If none of the above solutions are feasible, perform registration mark alignment manually.	

9.4 General Error Messages

Error message	Cause	Solution
[X POSITION ALARM POWER OFF THEN ON] or [Y POSITION ALARM POWER OFF THEN ON]	The cutting conditions specified for the medium to be cut are unreasonable.	Lower the SPEED setting. Lower the FORCE setting.
	Something is obstructing the pen carriage's movement.	After removing the obstacle, turn the plotter off then back on again.
	An external load was applied to the pen carriage during operation.	After removing the obstacle, turn the plotter off then back on again.
	Fragments of the cut medium have entered into the plotter's moving parts and are impeding their movement.	After removing the obstacle(s), turn the plotter off then back on again.
• The beeper sounds. • The PROMPT lamp lights.	The table of acceleration rates is faulty.	Replace the X motor or the Y motor. Replace the main board.

9.5 Error Messages in GP-GL Command Mode

Error message	Cause	Solution
ERROR 1 Command Error	The plotter received an unrecognizable command.	Press the plotter's ENTER key.
	When turning on the plotter to which your software application has output data, noise mixed into the data input.	
	Your software application's output device setting has changed.	Configure your software application menu to permit Graphtec plotter control. Re-specify the software application's interface conditions.
	The plotter's interface conditions have changed.	Re-specify the plotter's interface conditions.
ERROR 4 Parameter Overflow	The numeric parameter of an input command exceeds its permissible range.	Configure your software application menu to permit Graphtec plotter control. Re-specify the software application's interface conditions.
	Your software application's output device setting has changed.	
	The plotter's interface conditions have changed.	Re-specify the plotter's interface conditions.
ERROR 5 I/O Error	An error related to the receipt of data occurred within the interface.	Configure your software application menu to permit Graphtec plotter control Re-specify the software application's interface conditions..
	Your software application's output device setting has changed.	
	The plotter's interface conditions have changed.	Re-specify the plotter's interface conditions.

9.6 Error Messages in HP-GL Command Mode

If any of the HP-GL command error messages listed in the following table is displayed, the cause can nearly always be traced to one of the causes below:

(1) The software application's output device setting has changed; or

(2) The plotter's interface conditions have changed.

If a command error occurs while the COMMAND setting is HP-GL, therefore, first check the two corresponding points below.

(1) Configure the software to drive your plotter and ensure that the software's interface conditions are correctly set; and

(2) Re-specify the plotter's interface conditions.

Error message	Cause	Solution
ERROR 1 Instruction not recognized	An unrecognizable command was issued.	Issue a command that the plotter will recognize.
ERROR 2 Wrong number of parameters	A command was issued with the wrong number of parameters.	Re-issue the command with the correct number of parameters.
ERROR 3 Out of range parameters	A command containing an invalid parameter was issued.	Re-issue the command with its parameters specified within their permissible ranges.
ERROR 5 Unknown character set	An unknown character set was specified.	Specify a character set that the plotter will recognize.
ERROR 6 Position overflow	A command was issued with coordinate data that exceeds the effective cutting/plotting area.	Issue the command with its coordinate data specified within the effective cutting/plotting area.
ERROR 7 Buffer overflow	The data being input exceed the capacity of the downloadable character buffer, polygon buffer, etc.	Increase the buffer size.
ERROR 10 Invalid I/O output request	While executing an output command, the plotter received another output command.	Check the programmed data.
ERROR 11 Invalid byte following ESC	Receipt of the ESC character was followed by an invalid byte.	Check the programmed data.
ERROR 12 Invalid byte in I/O Control	A device control command containing an invalid byte was received.	Check the programmed data.
ERROR 13 Out of range I/O parameter	An I/O control command was issued with parameter outside of the permissible numeric range.	Check the programmed data.
ERROR 14 Too many I/O parameters	An I/O control command was issued with too many parameters.	Check the programmed data.
ERROR 15 Error in I/O transmission	During data transfer, a framing error, parity error, or overrun error occurred.	Check the settings of the RS-232C interface conditions.
ERROR 16 I/O buffer overflow	The I/O buffer received data faster than it could process the data.	Check the settings of the RS-232C interface conditions.

10. SPECIFYING THE PEN CONDITIONS

In preparation for starting a cutting operation, this chapter provides instructions on achieving optimum cutting conditions by specifying the cutter pen's blade type as well as the cutting FORCE, cutting SPEED, cutter OFFSET, and cutting QUALITY settings.

The cutter pen conditions for cutting media consists of the following five elements.

(1) Extended length of the cutter blade: See the table below to adjust the extended length of the cutter blade to suit the thickness of the medium being used. For instructions, see Section 2.4, "Adjusting the Length of the Cutter Blade."

(2) Cutting FORCE: Specify the FORCE setting based on the reference FORCE values listed in the table below.

(3) Cutting SPEED: Specify the SPEED setting based on the reference SPEED values listed in the table below.

(4) Cutter OFFSET: Specify the OFFSET setting based on the reference values listed in the table below.

(5) Cutting QUALITY: Specify the QUALITY setting based on the reference values listed in the table below.

10.1 The Cutter Pen's Conditions

Optimum Cutting Conditions by Media Type

Medium	Thickness (mm)	Blade used	FORCE	SPEED	QUALITY
Film for outdoor signs	0.05 to 0.08	CB09UA	10 to 14	30 or less	2 to 3
Decorative film	0.08 to 0.1	CB09UA	14 to 17	30 or less	2 to 3
Transparent or semi-transparent film	0.08 to 0.1	CB09UA	14 to 20	30 or less	2 to 3
Reflective film	0.08 to 0.1	CB09UA	14 to 20	30 or less	2 to 3
Fluorescent film	0.20 to 0.25	CB09UA, CB15U	20 to 24	10 to 20	2 to 3
Rubber for sandblasting	0.5 to 1.5	CB15U-K30	17 to 36	10 to 20	1 to 3
Thick paper	0.3 to 0.5	CB15U	28 to 40	10 to 20	1 to 2
Compressed styrofoam	0.8	CB15U-K30	37 to 42	10 to 20	1 to 2
High-luminance reflective film	0.25 to 0.3	CB15UA	23 to 24	5 to 25	1

Blade Part Nos., Displayed Blade Types, and OFFSET Values

Blade material	Blade's part no.	Display indication		Specifiable range	Default OFFSET
		Blade type	Displayed OFFSET		
Supersteel blades	CB09UA	09U	0	±5	17
	CB15-10U	15-10U	0	±5	18
	CB15U	15U	0	±5	28
	CB15U-K30	15U-K30	0	±5	28
Ceramic blade	CB15-10C	15-10C	0	±5	18
Sapphire blade	CB15-05S	15-05S	0	±5	9
Other		OTHER	1	1 to 45	1
Plotting pen		PEN	None	None	0

When a blade type has been selected, the default OFFSET value can be adjusted within a ±5 range.

Select OTHER when you will use a hard-to-cut medium that requires an OFFSET setting that is not listed under any of the blade types.

Select PEN for a plotting pen.

Reference Values for Plotting Conditions

Pen type	FORCE	SPEED	QUALITY
Water-based ballpoint pen	20 to 23	40	2 to 3
Oil-based ballpoint pen	18 to 23	40	2 to 3

To avoid unnecessary wear on the pen's tip, specify the FORCE value to its lowest permissible setting. When specifying the SPEED value, check that the plotted results are not too faint or otherwise unsatisfactory.

Note:

- Raising the SPEED and QUALITY settings results in a coarser finish but shortens the overall cutting/plotting time.
- Lowering the SPEED and QUALITY settings results in a finer finish but lengthens the overall cutting/plotting time.

Precautions on Cutting Rubber for Sandblasting

1. The amount of rubber that can be cut in one session varies with the characteristics of the medium (thickness, hardness, and weight) and the pattern to be cut. Use the medium that will actually be cut to alternately adjust the cutting conditions and run a cutting test.
2. If the rubber tends to curl, rubber that has been cut may come loose and contact the travelling cutter blade, thereby preventing the starting and end points of cutting from accurately matching.

10.2 Selecting a Set of Cutting Conditions

Four different sets of user-defined cutting conditions can be registered in the plotter's memory as COND Nos. 1 through 4. To specify a set of cutting conditions, you must first select the destination COND No. By selecting a different COND No., you can easily switch between pre-defined cutting conditions for four types of media.

Procedure

1. Press a function key (F1 , F2 , F3 , or F4) to select a pre-defined set of cutting conditions of the corresponding number.
2. The selected set of cutting conditions are loaded to the plotter and become the currently selected cutting conditions.

10.3 Specifying the Cutting Conditions

This section describes how to specify the cutter pen's blade type and its cutting FORCE, cutting SPEED, cutter OFFSET, and cutting QUALITY parameters.

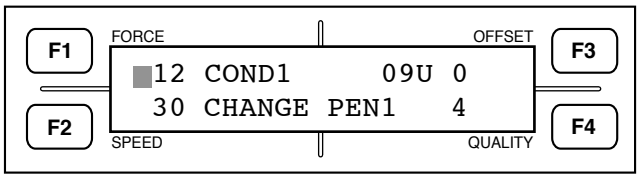
Note:
Before specifying the cutting conditions, first perform the setting procedure described in Section 5.6, "Specifying the Pen Conditions."

10.3.1 Specifying the Cutter OFFSET

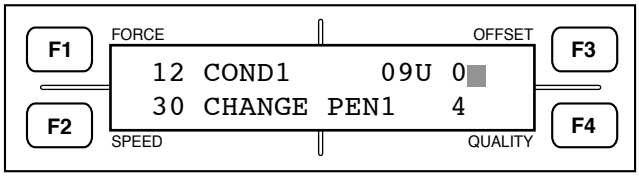
The OFFSET parameter lets you specify a corrective cutter offset value when required by the blade type being used. When the pen type is PEN, a plotting pen can be used. When it is a blade type or OTHER, a cutter pen can be used.
Because the tip of the blade mounted in the cutter pen's plunger is not positioned along the center line of the pen, the tip's offset from the pen's center must be corrected by setting the OFFSET parameter. With this plotter, the optimum OFFSET value for each blade type has been registered in advance and is automatically selected when a blade type is specified. In addition, fine adjustment of the pre-registered OFFSET value for each blade type is possible within a ±5 range.

Setting Procedure

1. Press a function key from [F1] to [F4] to select the COND No. of the cutting conditions to be edited.
2. Press the [↵] CONDITIONS key to display the menu below for specifying the cutting conditions.



3. Press the [F3] (OFFSET) key to move the ■ blinking cursor to the upper right position as shown in the following figure. In this status, the blade type can be changed by pressing the ◁ or ▷ POSITION key. Select the blade type to match the currently mounted blade.



4. If the pen type setting is a cutter blade, press the △ or ▽ POSITION key to finely adjust the OFFSET value for that blade type within a ±5 range.
5. When the displayed conditions are satisfactory, press the [↵] ENTER key. To exit this setting operation without registering your new setting(s), press the [NEXT PAGE] NEXT PAGE key before pressing the ENTER key.

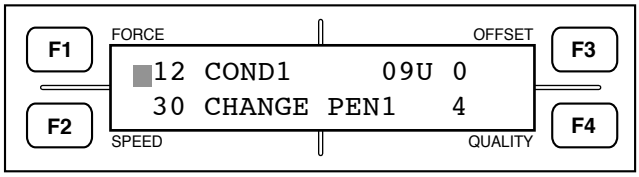
Caution:
When PEN No. 2 is selected for a set of pen conditions at the SELECT PEN menu, you cannot switch the pen type from PEN to a blade type.

10.3.2 Specifying the Cutting/Plotting FORCE

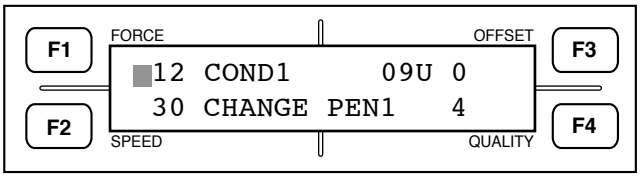
The FORCE parameter is used to specify the pressure applied either by the cutter pen during cutting or by the plotting pen during plotting.
Select the FORCE setting while referring to the optimum FORCE setting for both your pen type and the currently loaded medium.

Setting Procedure

1. Press a function key from F1 to F4 to select the COND No. of the cutting conditions to be edited.
2. Press the CONDITIONS key to display the menu below for specifying the cutting conditions.



3. Press the F1 (FORCE) key to move the ■ blinking cursor to the upper left position as shown in the following figure.



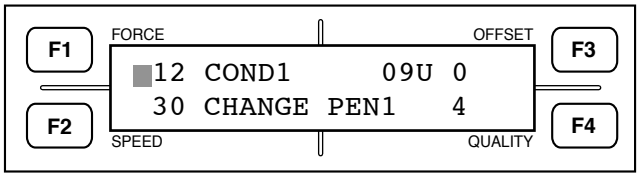
4. To change the FORCE setting, press the △ or ▽ POSITION key to specify a FORCE setting in a range from 1 to 48.
5. When the displayed conditions are satisfactory, press the ENTER key. To exit this setting operation without registering your new setting(s), press the NEXT PAGE key before pressing the ENTER key.

10.3.3 Specifying the Cutting SPEED

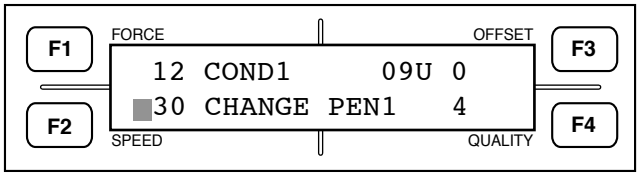
The SPEED parameter is used to specify the travelling speed of either the lowered cutter pen during cutting or the lowered plotting pen during plotting.
Select the SPEED setting while referring to the optimum SPEED setting for both your pen type and the currently loaded medium.

Setting Procedure

1. Press a function key from F1 to F4 to select the COND No. of the cutting conditions to be edited.
2. Press the CONDITIONS key to display the menu below for specifying the cutting conditions.



3. Press the F2 (SPEED) key to move the ■ blinking cursor to the lower left position as shown in the following figure.



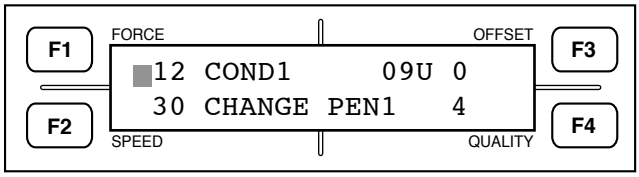
4. To change the SPEED setting, press the △ or ▽ POSITION key. Permissible SPEED values are: 1 through 10, 15, 20, 25, 30, 35, 40, 45, 50, 55, 60, and 65.
5. When the displayed conditions are satisfactory, press the ENTER key. To exit this setting operation without registering your new setting(s), press the NEXT PAGE key before pressing the ENTER key.

10.3.4 Selecting the Cutting QUALITY

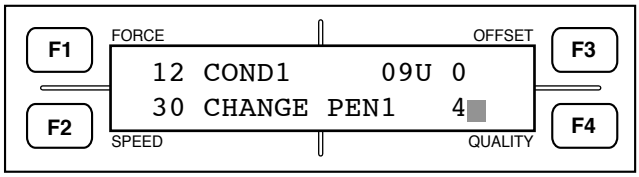
The QUALITY parameter is used to specify the acceleration rate during cutting or plotting.
Select the QUALITY setting while referring to the optimum QUALITY setting for both your pen type and the currently loaded medium.

Setting Procedure

1. Press a function key from [F1] to [F4] to select the COND No. of the cutting conditions to be edited.
2. Press the [↵] CONDITIONS key to display the menu below for specifying the cutting conditions.



3. Press the [F4] (QUALITY) key to move the ■ blinking cursor to the lower right position as shown in the following figure.



4. To change the QUALITY setting, press the △ or ▽ POSITION key to specify the QUALITY setting in a range from 1 to 6. A lower value selects a slower acceleration rate which results in higher quality.
5. When the displayed conditions are satisfactory, press the [↵] ENTER key. To exit this setting operation without registering your new setting(s), press the [📖] NEXT PAGE key before pressing the ENTER key.

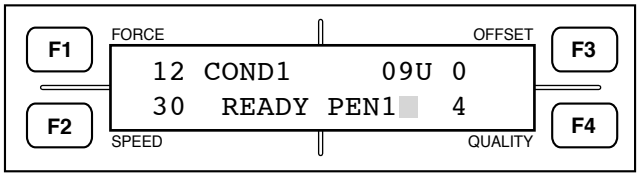
10.3.5 Setting Cutting Conditions in THICK MODE

Select the THICK MODE setting when you will be cutting either thick media (such as masking rubber for sandblasting or thick paper for apparel patterns) or thin but hard media (such as acrylic film).

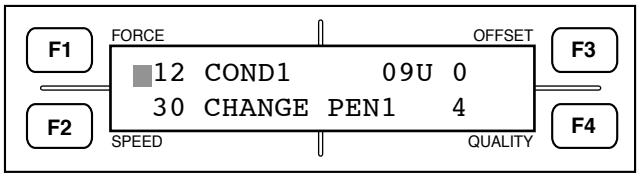
Note:
For more information about the THICK MODE parameter, see Section 6.4, “Enabling the THICK MODE Setting.”

Setting Procedure

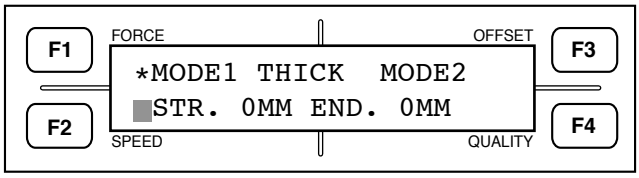
1. When the THICK MODE setting has been enabled for the currently selected COND No., the display appears as follows.



2. Press the [↵] CONDITIONS key to display the menu below for specifying the cutting conditions.



3. Press the [↵] ENTER key to display the THICK MODE menu shown below.



4. Press the [F1] (MODE 1) or [F3] (MODE 2) key to move the asterisk symbol and select MODE 1 or 2.

   MODE 1 : Overcutting is performed at the starting and end points of cutting as well as at corners with a sharp angle in order to prevent incomplete cut areas of the medium. Moreover, because the blade is moved across the medium’s surface in one stroke when the cutter’s blade must rotate by a wide angle, this mode allows you to cut thicker media or perform more detailed cutting than is possible in MODE 2.

   MODE 2 : Overcutting is only performed at the starting and end points of cutting. Because MODE 2 performs simpler blade control of the travelling cutter blade than MODE 1, the overall cutting time is shorter.

   Press the [F2] (STR.) or [F4] (END) key to move the ■ blinking cursor next to the STR. or END setting. In this status, press the △ or ▽ POSITION key to specify the overcut distance.

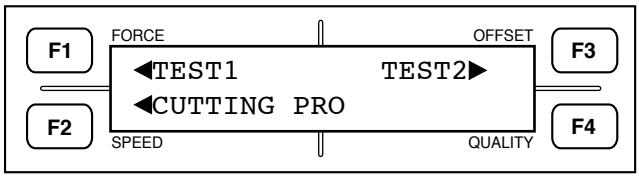
5. When the displayed conditions are satisfactory, press the [↵] ENTER key. To exit this setting operation without registering your new setting(s), press the NEXT PAGE key before pressing the ENTER key.

10.4 Running a Cutting Test

After specifying the blade type, FORCE, and SPEED settings, run a cutting test to actually confirm the combined impact of your settings. Check how deeply the medium has been cut and the roundness of the cut corners. If the cut results are not satisfactory, specify your cutting conditions once more and then run another cutting test. Repeat these two steps until the optimum cutting conditions are achieved.

Setting Procedure

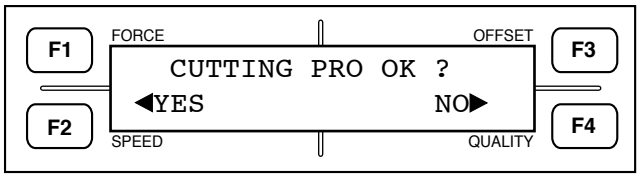
1. Load the medium that will actually be used for cutting.
2. Press a function key from [F1] to [F4] to select the target COND No.
3. Press the [▲] TEST key to display the TEST menu below.



4. Using the ◁, ▷, △, ▽ POSITION keys, move the carriage to the position on the medium from which you wish to start the cutting test.

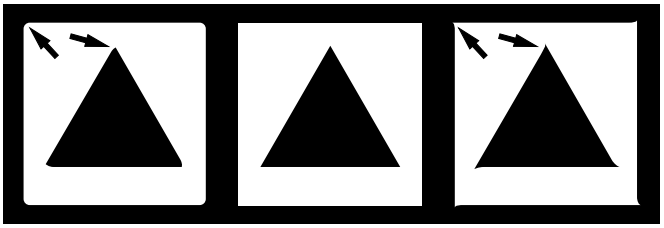
Caution:
The cutter pen will start moving as soon as the TEST function is selected, so be sure to keep your hands, hair, and so forth away from the plotter's moving parts.

5. Press the [F1] (TEST 1) key to cut a single test pattern, consisting of a triangle within a square, at the cutter pen's current position.
   Press the [F3] (TEST 2) key to cut three test patterns, each consisting of a triangle within a square, at the cutter pen's current position. Among the three patterns, the first pattern is cut using the current FORCE setting minus 1, the second pattern is cut using the current FORCE setting, and the third pattern is cut using the current FORCE setting plus 1.
   Press the [F2] (CUTTING PRO) key to display the CUTTING PRO prompt menu shown below.



   While the above menu is displayed, press the [F2] (YES) key to cut out the CUTTING PRO characters from the cutter pen's current position. To return to Step (3) without running the CUTTING PRO test, press the [F4] (NO) key.

6. Check the cut pattern(s). Peel off the four outside corners of the test pattern(s) that you cut by selecting TEST 1 or 2, and then look at the corners of the inner triangle. If the corners are rounded, the OFFSET setting is too low. Conversely, if the corners are too pointed, the OFFSET setting is too high.



Insufficent offset
Raise the OFFSET value
(+1 to +5)

Ideal offset

Excessive offset
Lower the OFFSET value
(–1 to -5)

7. Next, peel off the corners of the triangle(s). Ideally, only slight traces of the cutter blade should remain on the medium's base sheet. If the base sheet has been cut through, either the FORCE setting is too high or the cutter blade's tip is extended too far. If the base sheet shows only a few traces of the cutter blade, either the FORCE setting is too low or the cutter blade's tip is not sufficiently extended.

8. Press the CONDITIONS key to display the menu for specifying the cutting conditions, then adjust the FORCE and OFFSET settings.

9. Repeat Steps (3) through (8) until you achieve satisfactory test results.

10. When satisfactory test results are achieved, press the ENTER or NEXT PAGE key to return the plotter to READY status.

11. PART LIST

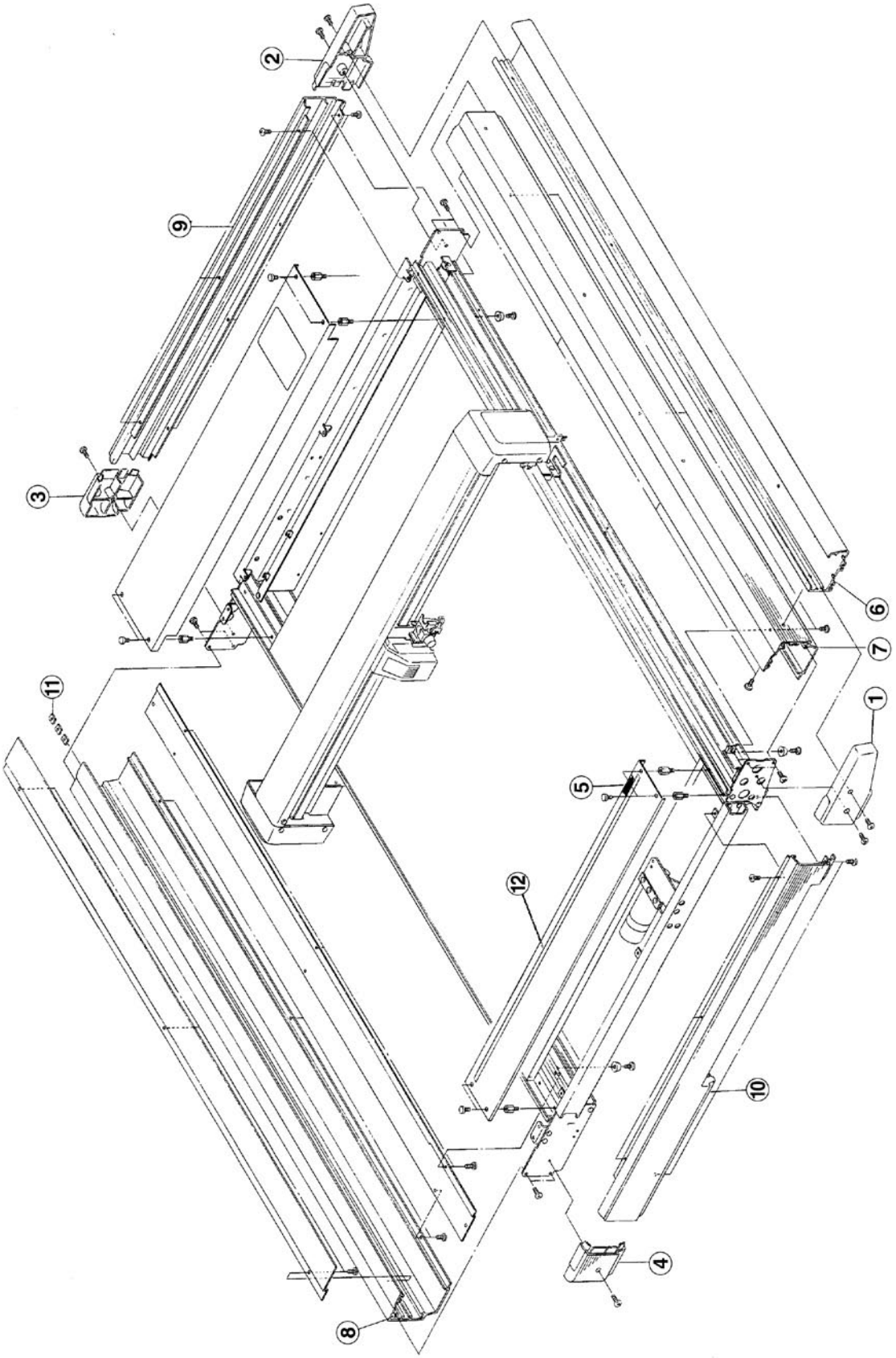
11.1 Recommended List of Parts

Part No.	Description	Name	Remarks
792420100	4200 Main Board		
772219530	4200 Pen Board		FC4200-50, FC4200-60
772121520	4210 Pen Board		FC4210-60
792219701	Pen Block		FC4200-50, FC4200-60
792121701	4210 Pen Block Assy		FC4210-60
772219510	4200 Relay		
772219520	4200 Mark Sensor Assy		FC4200-50, FC4200-60
772121530	4210 Mark Sensor Assy		FC4210-60
500050535	KR1228	Mark Sensor	
772219500	4200 X Sensor		
370801091	X Drive Belt	Belt 120S2M160U	
622190411	Y Slide Belt 4250	Y Belt 4250	FC4200-50
622191411	Y Slide Belt 4260	Y Belt 4260	FC4200-60, FC4210-60
618122100	X Intermediate Pulley	X Intermediate Pulley 60	
622190130	X Tension Pulley	X Tension Pulley	
622190151	Pulley S2M-Z30	Pulley S2M-Z30	
622190401	X Belt 4250	X Belt 4250	FC4200-50
622191401	X Belt 4260	X Belt 4260	FC4200-60, FC4210-60
622190140	P4 Y Tension Pulley	P4 Y Tension Pulley	
622190350	Inertia Pulley Z24	Inertia Pulley Z24	
500050538	4200 Fan	TUDC24B4-602	
772219560	4200 Control Panel Relay Board	Control Panel Relay Board	
772219600	4250 Elect-static Panel SW		FC4200-50
622190490	Pen Sense Rubber		FC4200-50, FC4200-60
772219550	Operation Sheet (domestic)		
622190420	Inertia Wheel	Inertia 42	
771900580	LCD Assembly	LCD GND2020B	
122527140	Y Flex Cable	FCA2252014	FC32
775421810	X Motor		FP90
775421830	Y Motor		FP90
691800520	X Flex Cable A1	FPC,06710	FC4200-60, FC4210-60,FP91
691800530	X Flex Cable A2	FPC,67110	FC4200-50, FP92
775421740	High Voltage Unit		FC4200-50, FP90
510000051	Power Supply Unit	PS089B	Non-RoHS Model
682247530	Power Supply Unit	LEP100F-36	RoHS Model
772219660	Power Relay Board	PN5042-04	RoHS Model
054112100	20Z Pulley 14		FP61
772160580	Y Drive Pulley		FC21
379500004	Y Drive Belt	100TN15-10W	GX10
035132220	P Deenergize Brush		MP50
054212140	Wiper		FP80
054212201	L Roller S		FP80
054212211	L Roller L		FP80
054212221	L Roller SC		FP80
054212231	L Roller LC		FP80
095013010	Roller BB13		GX10
031009020	Positioning Seal		MP30
508000025	Power Supply SW	JWA2120-0033	3120
313068820	Roller B	688ZZNRAV2S	

11.2 External Casing

No.	Part No.	Description	Name	Remarks	Q'ty
1	022550180		Corner Cover 50L		1
2	022550190		Corner Cover 50R		1
3	054215240		Corner Cover -A	FP80	1
4	054215250		Corner Cover -B	FP80	1
5	622190490		Pen Sense Rubber	FC4200-50, FC4200-60 only	1
6	622195061		Operation Tray 4250	FC4200-50	1
	622195561		Operation Tray 4260	FC4200-60, FC4210-60	1
7	022550130		Front Cover 50H	FC4200-50	1
	622195540		Front Cover 4260	FC4200-60, FC4210-60	1
8	054225030		Front Cover A2	FC4200-50	1
	622195551		Rear Cover 4260	FC4200-60, FC4210-60	1
9	622195121		Side Cover 50	FC4200-50	1
	622195621		Side Cover 60	FC4200-60, FC4210-60	1
10	622195132		Interface Cover 50	FC4200-50	1
	622195632		Interface Cover 60	FC4200-60, FC4210-60	1
11	622190250		Plate Nut		
12	308002001		Measure ST13-01BP		1

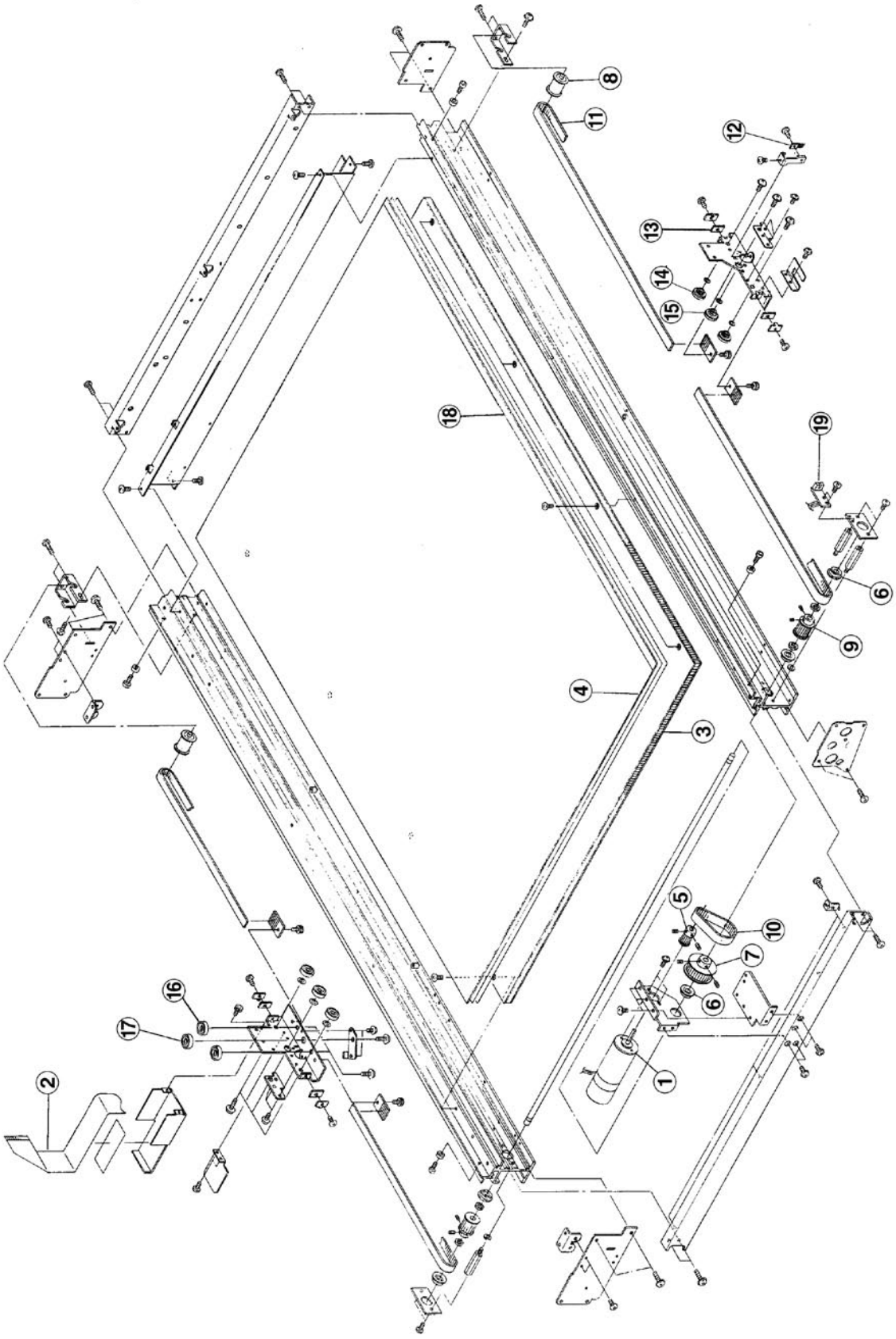
External Casing



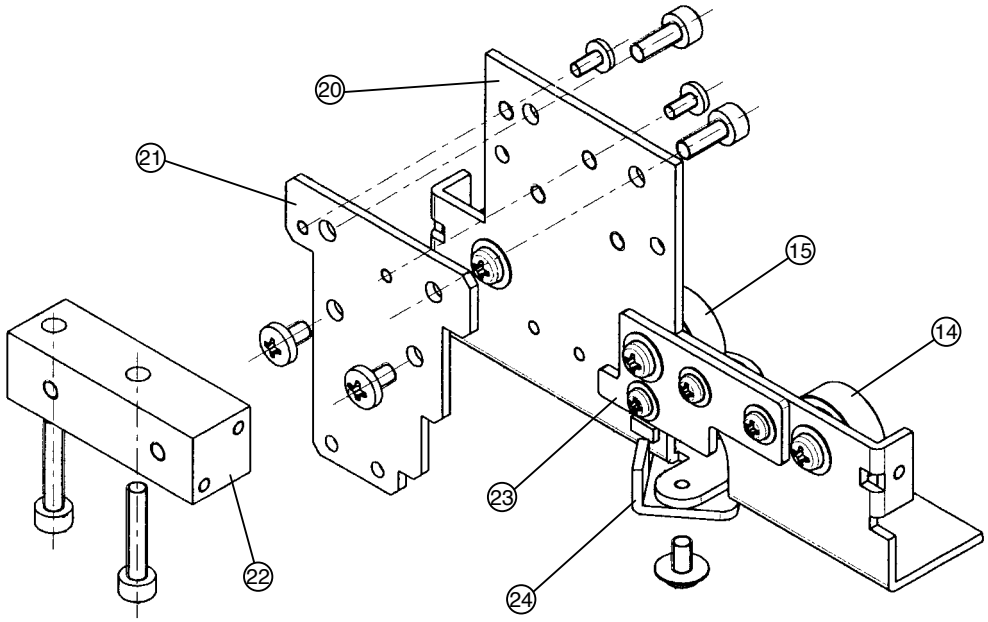
11.3 Main Frame, X Slide Section, and X Drive Section

No.	Part No.	Description	Name	Remarks	Q'ty
1	775421810	X Motor	X Motor	FP80	1
2	691800530	X Flex Cable Section A2	FPC, 06711	FC4200-50, FP92	1
	691800520	X Flex Cable Section A1	FPC, 06710	FC4200-60, FC4210-60, FP91	1
3	054220010	Honeycom board	A2 Honeycom board	FC4200-50, FP82	1
	022552120	Honeycom board	Honeycomb Panel 3260	FC4200-60, FC4210-60, 3260	1
4	771805000	Elect-static Adhesion Panel	92 Elect-static Panel	FC4200-50, FP92	1
	022552010	Writing Panel	PV Panel 92x66	FC4200-60	1
	621210100	Writing Panel	PV Panel 4210	FC4210-60	1
5	054112100	X Motor Pulley	20Z Pulley 14	FP61	1
6	313068820	Roller B	688ZZNRAV2S		5
7	618122100	X Intermediate Pulley 60	X Intermediate Pulley 60		1
8	622190130	X Tension Pulley	X Tension Pulley		2
9	622190151	Pulley S2M-Z30	Pulley S2M-Z30		2
10	370801091	X Drive Belt	Belt 120S2M160V		1
11	622190401	X Slide Belt	X Belt 4250	FC4200-50	2
	622191401	X Slide Belt	X Belt 4260	FC4200-60, FC4210-60	2
12	035132220	Anti-static Brush	P Anti-static Brush Brush	MP50	1
13	054212140	Wiper	Wiper	FP80	4
14	054212201	Roller S	Roller S		4
15	054212211	Roller L	Roller L		2
16	054212221	Roller SC	Roller SC		2
17	054212231	Roller LC	Roller LC		1
18	308002001	Tape Measure	Measure ST13-01BP		1
19	772219500	X Sensor Board Assy	4200X Sensor		1
19-1	508000005	X Home Sensor	SW, GP1A52HR		1
20	621212000	X Rear Slider Base	X Rear Slider Base RK	FC4210-60	1
21	621212030	Applying Plate	Applying Plate	FC4210-60	1
22	621212020	Block	Block	FC4210-60	1
23	054212240	Vertical Tension Plate	V Plate	FC4210-60	1
24	054212120	Tension Plate	Per-Tension Arm H3	FC4210-60	1

Main Frame, X Slide Section, and X Drive Section



X Rear Slide Section for FC4210-60

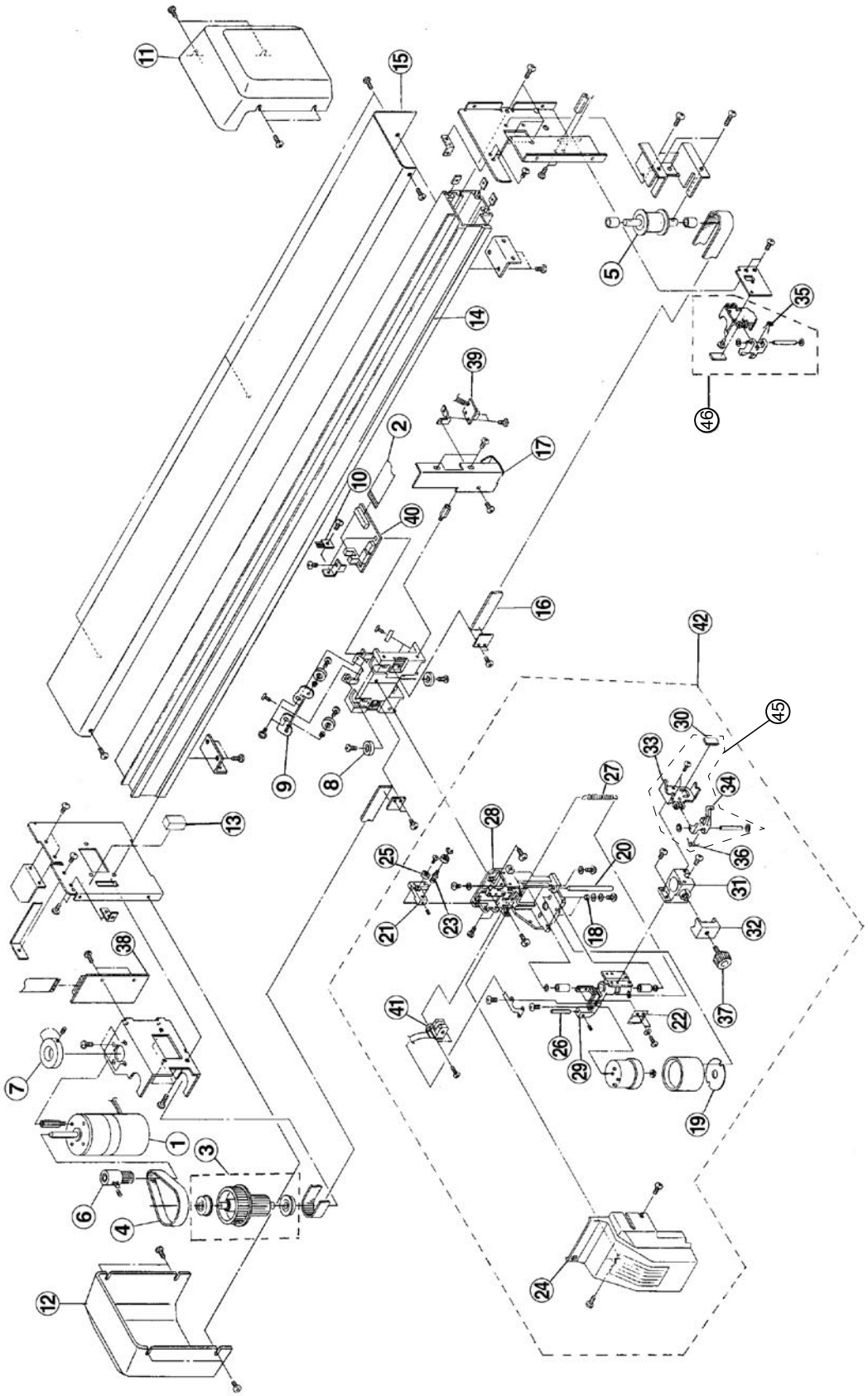


11.4 Y Bar, Y Slide Section, Y Drive Section, and Pen Block Section

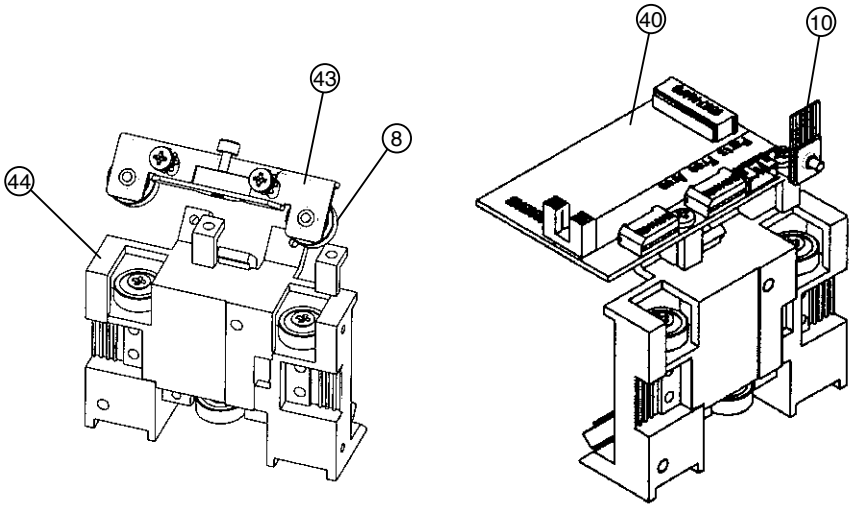
No.	Part No.	Description	Name	Remarks	Q'ty
1	775421830	Y Motor	Y Motor	FP80	1
2	122527140	Y Flex Cable	FCA2252014	3250	1
3	772160580		Y Drive Pulley Assembly	FC21	1
4	379500004	Y Drive Belt	100TN15-10W	GX10	1
5	622190140		P4 Y Tension Pulley		1
6	622190350		Inertia Pulley Z24		1
7	622190420		Inertia 42		1
8	095013010	Roller	Roller BB13	GX10	5
9	621113010		BR Tension Plate	FC4200-50, FC4200-60, CE10	1
	621213000		Y Tension Plate FC4210-60	FC4210-60	1
10	035132220		Anti-static Brush		1
11	322195213		Y End Cover F		1
12	622145202		Y End Cover R		1
13	322190500		Stopper 8mm		1
14	622190091	Y Rail	Y Rail FC4200-50	FC4200-50	1
	622191091	Y Rail	Y Rail FC4200-60	FC4200-60, FC4210-60	1
15	622195031		Y Rail Cover FC4200-50	FC4200-50	1
	622195531		Y Rail Cover FC4200-60	FC4200-60, FC4210-60	1
16	622190411	Y Belt	Y Belt FC4200-50	FC4200-50	1
	622191411	Y Belt	Y Belt FC4200-60	FC4200-60, FC4210-60	1
17	622192130	Mark Sensor Base Braket	Mark Sensor Base	FC4200-50, FC4200-60	1
	621213100	Mark Sensor Base Braket	Mark Sensor Base FC4210	FC4210-60	1
18	095004130		MC Insulating Collar	FC4200-50, FC4200-60	2
	095004130		MC Insulating Collar	FC4210-60	4
19	095704040		Insulating Sheet B	FC4200-50, FC4200-60	1
	095704040		Insulating Sheet B	FC4210-60	2
20	617363321		LB4YC Assembly	FC4200-50, FC4200-60	1
	621214000		LM6L Assembly	FC4210-60	2
21	619003360	Bearing Roller Base	BR Base	FC4200-50, FC4200-60	1
	621214051	Bearing Roller Base B	BR Base Bracket	FC4210-60	1
	621214060	Bearing Roller Base	BR Base	FC4210-60	2
22	617363351		Pen Encoder Strip	FC4200-50, FC4200-60	1
	617363351		Pen Encoder Strip	FC4210-60	2
23	619003371		Offset Pin Shaft	FC4200-50, FC4200-60 Only	1
24	619004011		Carriage Cover	FC4200-50, FC4200-60	1
	621216000		Carriage Cover FC4210-60	FC4210-60	1
25	310068320	Bearing Roller	683ZZMC3PS2S	FC4200-50, FC4200-60	2
	310068320	Bearing Roller	683ZZMC3PS2S	FC4210-60	4
26	617363390		Guide Shaft	FC4200-50, FC4200-60	1
	617363390		Guide Shaft	FC4210-60	2
27	380205381		Tension Spring E-538	FC4200-50, FC4200-60	1
	380205551		Tension Spring E-555	FC4210-60	2
	621214070		Spring Bracket	FC4210-60	1
28	622192050	Moving Coil Base	MC Base 42	FC4200-50, FC4200-60	1
	621214010	Moving Coil Base	MC Base 4210	FC4210-60	1
29	622192040		Pen Arm 42	FC4200-50, FC4200-60	1
	621214020		Pen Arm 4210	FC4210-60	2
30	053203420		Magnet	FC4200-50, FC4200-60	2
31	622192012		Cutter Holder A	FC4200-50, FC4200-60	1
	021500631		Cutter Holder	FC4210-60	2
32	622192022		Cutter Holder B	FC4200-50, FC4200-60	1
	621214100		Cutter Pen Stopper	FC4210-60	2
33	622192060		Pen Holder AP	FC4200-50, FC4200-60	2
34	622192071		Lock Arm	FC4200-50, FC4200-60	2

No.	Part No.	Description	Name	Remarks	Q'ty
35	622192081		Arm Spring 1	FC4200-50, FC4200-60	1
36	622192091		Arm Spring 2	FC4200-50, FC4200-60	1
37	621113590		Thumb Screw L10	FC4200-50, FC4200-60	1
	621113580		Thumb Screw L14	FC4210-60	
38	772219510		4200 Relay Board		1
39	772219520		4200 Mark Sensor Board	FC4200-50, FC4200-60	1
	772121530		4210 Mark Sensor Board	FC4210-60	2
39-1	500050535	Mark Sensor	KR1228	FC4200-50, FC4200-60	1
	500050535	Mark Sensor	KR1228	FC4210-60	2
40	772219530		4200 Pen Board	FC4200-50, FC4200-60	1
	772121520		4210 Pen Board	FC4210-60	1
40-1	508000015	Y Home Sensor	GP1A53HR		1
41	500050122	Encoder	HEDS-9720#P50		1
42	792219701		FC4200 Pen Block Assy		1
	792121701		FC4210 Pen Block Assy		1
43	621213000		Y Slider Pre-Tension Plate	FC4210-60	1
44	622192200		Y Slider		1
45	792219702		Pen Holder AP Assy	FC4200-50, FC4200-60	1
46	792219703		Pen Station AP Assy	FC4200-50, FC4200-60	1
47	622190500		Stopper 8MM	FC4210-60	2
48	621212010		Flexible Cable Guide K	FC4210-60	1
49	621212020		Flexible Cable Guide B	FC4210-60	1

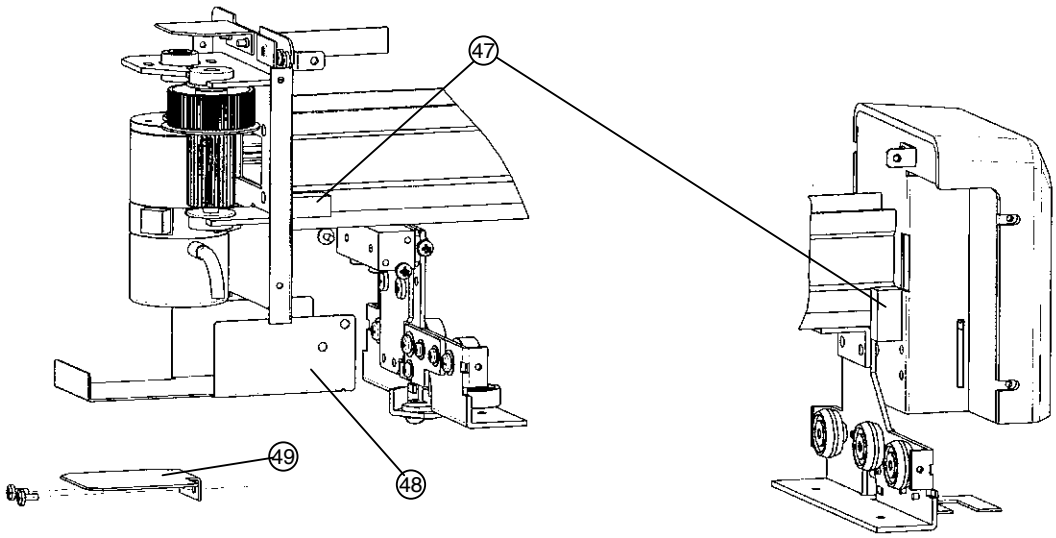
Y Bar, Y Slide Section, Y Drive Section, and Pen Block Section



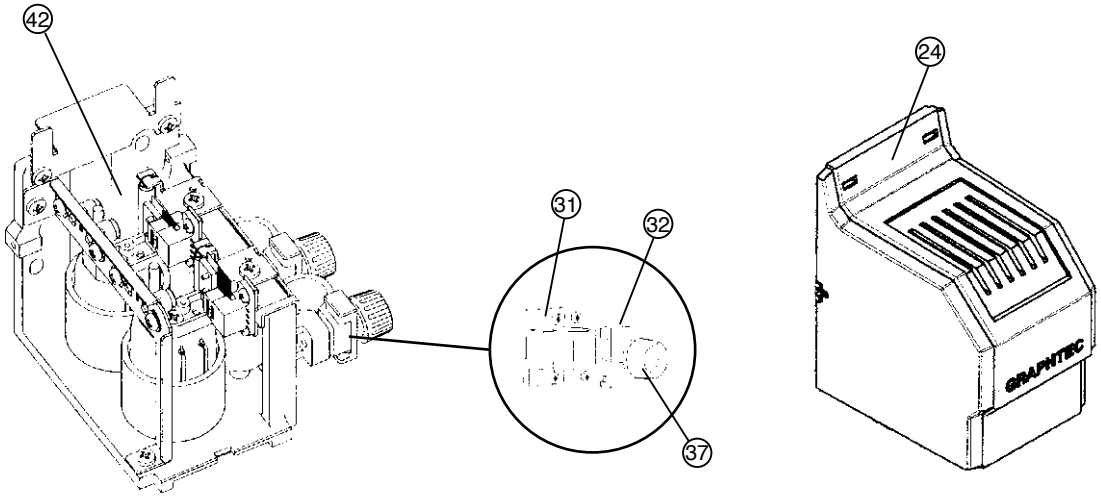
Y Slide Section for FC4210-60



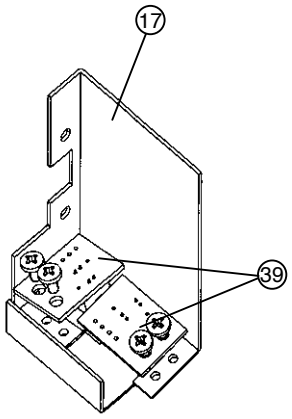
Y Drive Section for FC4210-60



Pen Block Section for FC4210-60



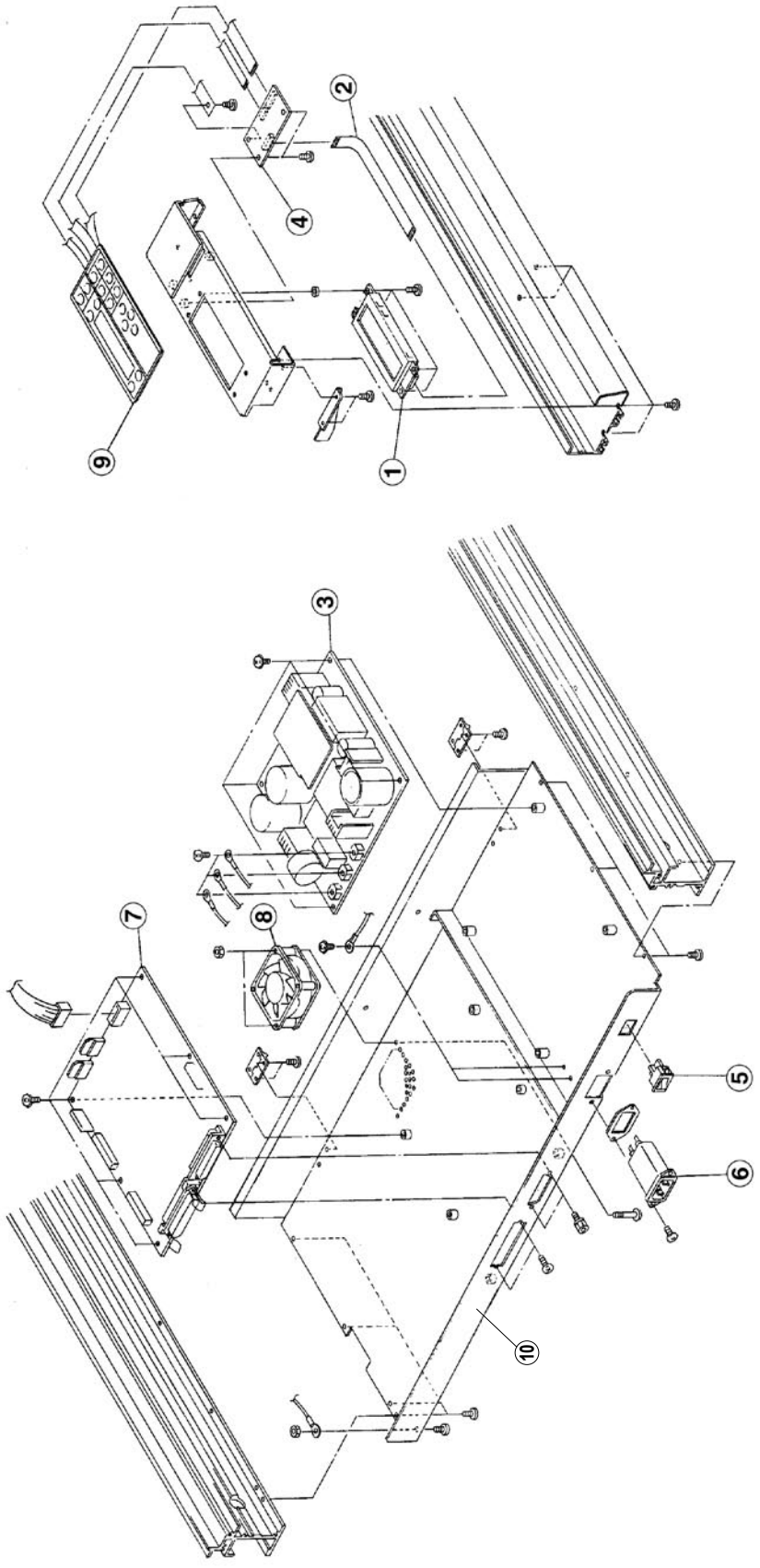
Registration Mark Sensor Section for FC4210-60



11.5 Electrical Section

No.	Part No.	Description	Name	Remarks	Q'ty
1	771900580	LCD (New)	GMD2020B Assembly	New LCD	1
2	122527110	Control Panel Cable	CA2252-11		1
3	510000051	Switching Power Supply	PS089B	Non-RoHS Model	1
	682247530	Switching Power Supply	LEP100F-36	RoHS Model	1
	772219660	Power Relay Board	PN5042-04	RoHS Model	1
4	772219560	Control Panel Relay Board	4200 Control Panel Relay Board		1
5	508000025	Power Supply SW	JWA2120-0033		1
6	518000033	Inlet	SUP-B3G-E		1
7	792420100	4200 Main Board	4200 Main Board		1
8	500050538	Fan	TUDC24B4-602		1
9	772219550	FC4200 Control Panel Sheet	FC4200 Control Panel Sheet		1
10	622191293	Chassis 60 (Non-RoHS Model)	Chassis 60	FC4200-60/FC4210-60	1
	622191294	Chassis 60 (RoHS Model)	Chassis 60	FC4200-60/FC4210-60	1
	622190293	Chassis 50 (Non-RoHS Model)	Chassis 50	FC4200-50	1
	622190294	Chassis 50 (RoHS Model)	Chassis 50	FC4200-50	1
11	775421740	High-voltage Unit	4250 High-voltage Board	FC4200-50	1
12	772219600	4250 Elect-static Panel SW	4250 Elect-static Panel SW	FC4200-50	1
13	692819010	Cable Power Supply to Main Board	CA905001		
14	692819110	Cable, Switch to LEP100F-36	CA905011	RoHS Model	1
15	692819120	Cable, LEP100F-36 to Power Relay Board	CA905012	RoHS Model	1

Electrical Section



11.6 Accessories, and Others

No.	Part No.	Description	Name	Remarks	Q'ty
1	957000029	Water Ball-Point Pen	KB540-S1-1		1
2	972200641	Cutter Blade Holder	PHP32-CB15N		1
3	972100250	Cutter Blade	CB15U-2P		1
4	622190911	User's Manul	FC4200-UM-152	FC4200-50, FC4200-60	1
	621219920	User's Manul	FC4210-UM-151	FC4210-60	1
5	500051720	Power code UL/CSA	AC Power UL 2.5M	115V UL	1
	500050024	Power code CEE	YM0306B-0304B 2M	220V CEE	1
	520100103	Power code SUS	PISEV-H05VV-F-1C	220V SEV	1
	520000022	Power code BS	GRCK-B0	220/240V BS without plug	1
	520000005	Power code BS with Plug	Z-VCTF-OR-BS	220/240V BS with plug	1
	520100099	Power code SAA	SAA Code Set	240 AS	1
6	621219000	Creasing Tool	Creasing Pen	FC4210-60	1
7	621219010	Adhesive sheet	Adhesive sheet	FC4210-60	1
8	621219020	Application Sheet	Application Sheet	FC4210-60	1
9	622190810	Packing Box for FC4200-50	Packing Box FC4250		1
	622190800	Packing Box for FC4200-60	Packing Box FC4260		1
	621219900	Packing Box for FC4210-60	Packing Box FC4210		1

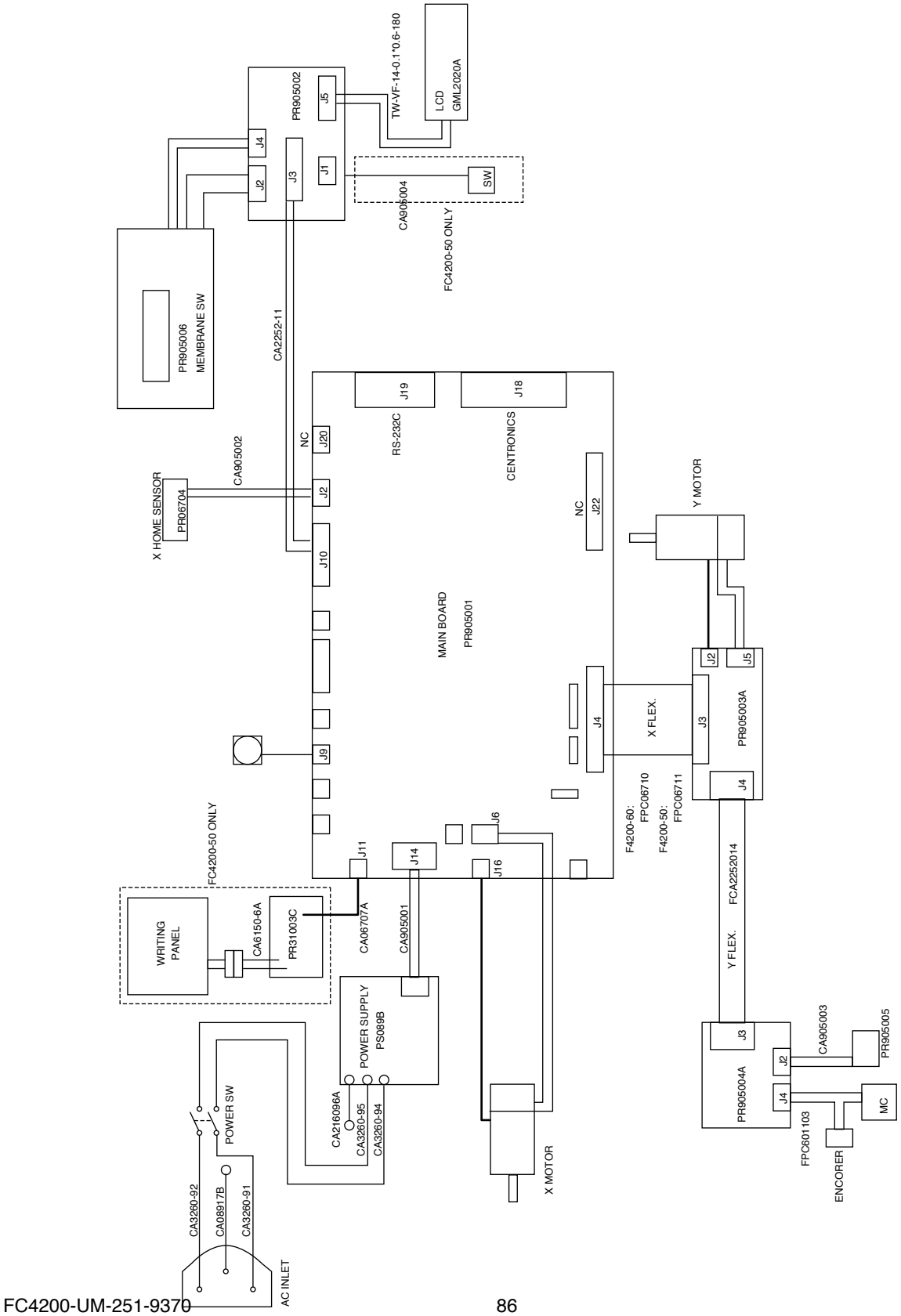
11.7 Option Stand for FC4200-60 and FC4210-60 (ST0032)

No.	Part No.	Description	Name	Remarks	Q'ty
1	772219400	ST0032 Stand Assy	ST0032 Stand Assy		1
2	622193010	Stand Frame	Frame 32		1
3	622193020	Sleeve Bracket 32	Sleeve 32		2
4	054211141	Right Side Foot	Right Side Foot		1
5	054211070	Left Side Foot	Left Side Foot		1
6	380000069	Adjustor Foot	Adjustor		4
7	054211200	Spacer GT	Spacer GT		5
8	054211181	Front Main Bar	Front Main Bar		1
9	054211191	Rear Main Bar	Rear Main Bar		1
10	054211000	Drawer	Drawer		2
11	054211010	End Cap	End Cap		6
12	391914201	Coin Screw	Coin Screw		3
13	621219010	Right Side Leg	Right Side Leg		1
14	621219020	Left Side Leg	Left Side Leg		1

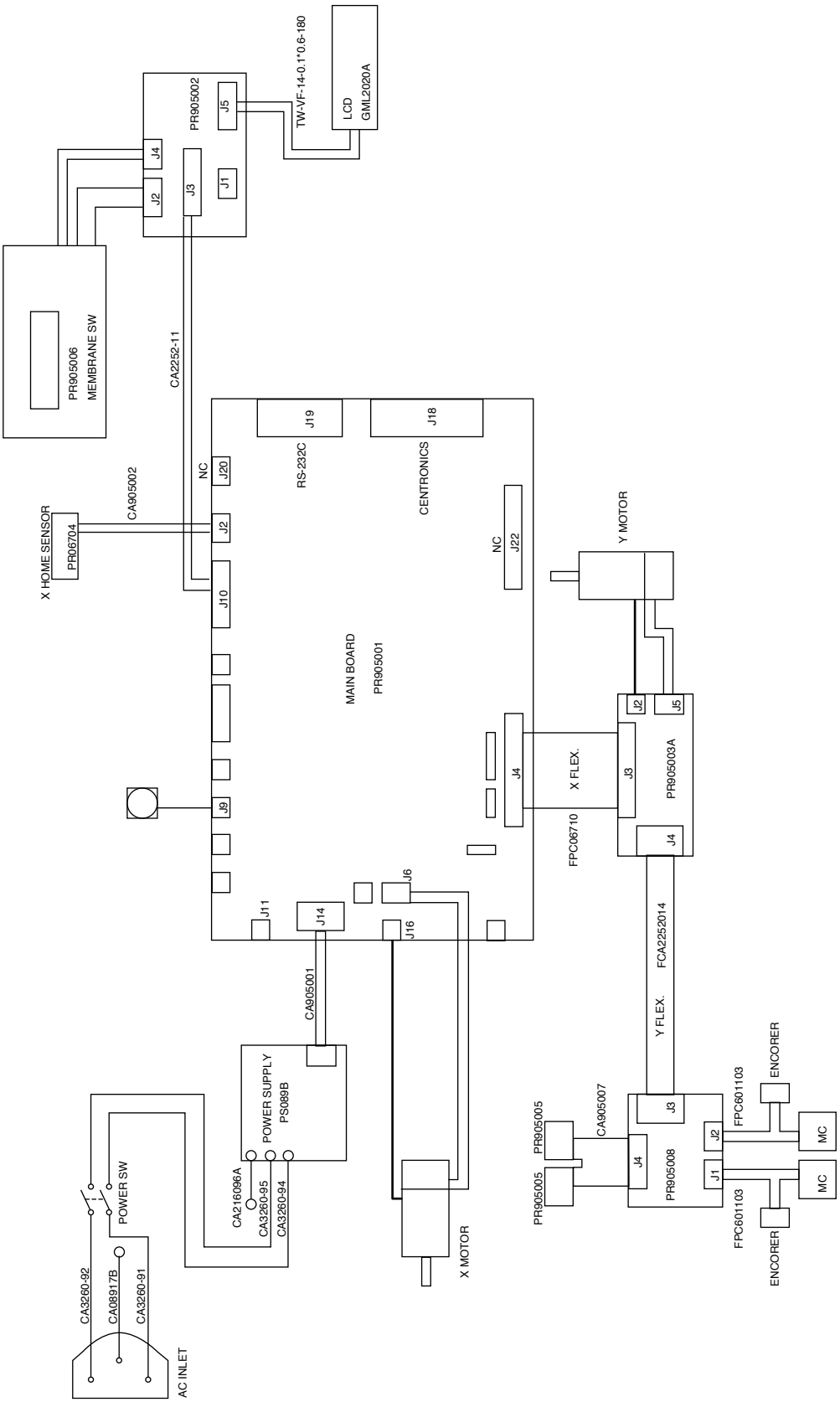
12. CIRCIT DIAGRAMS

12.1 Wiring Diagram

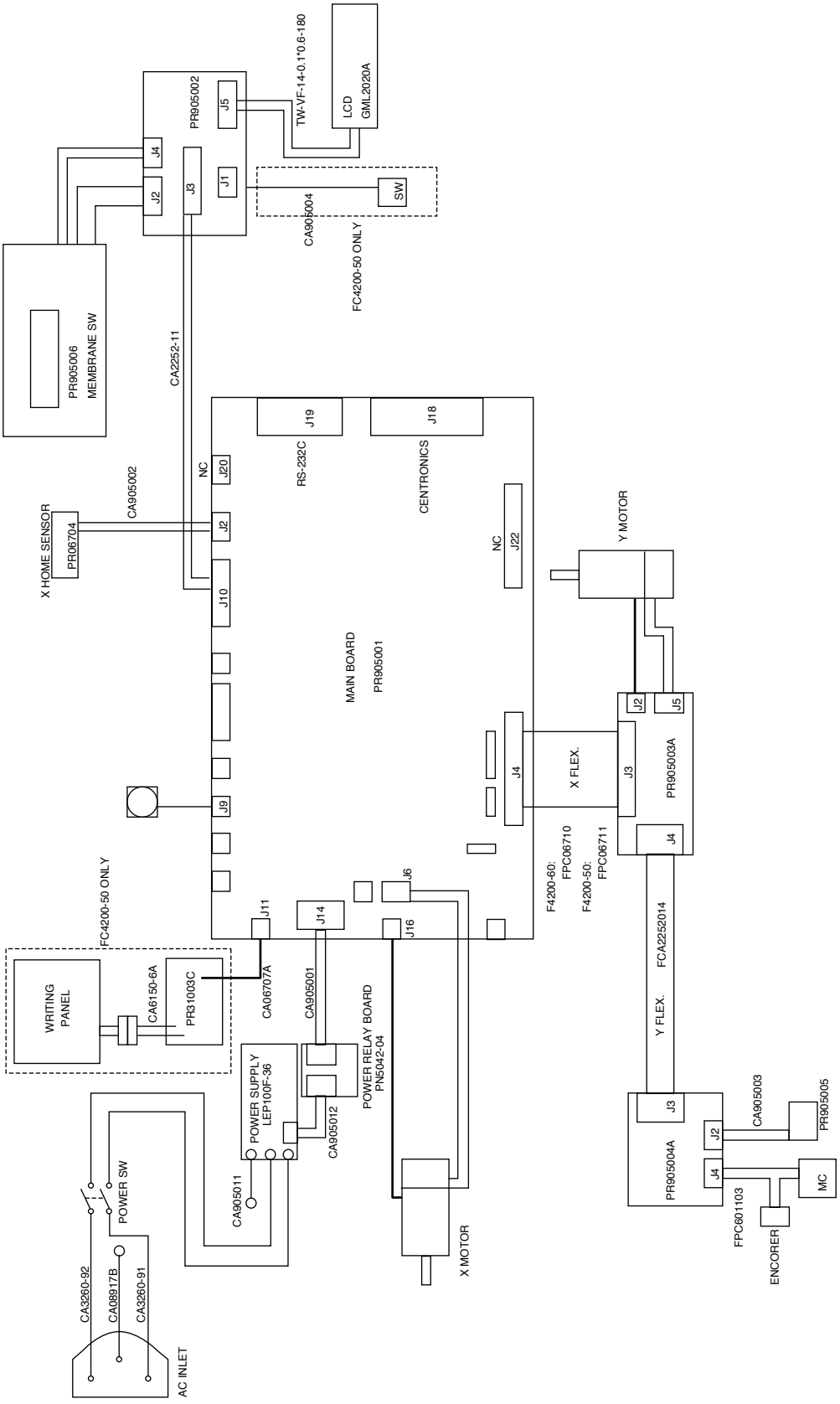
12.1.1 Wiring Diagram for FC4200-50 and FC4200-60 (Non-RoHS model)



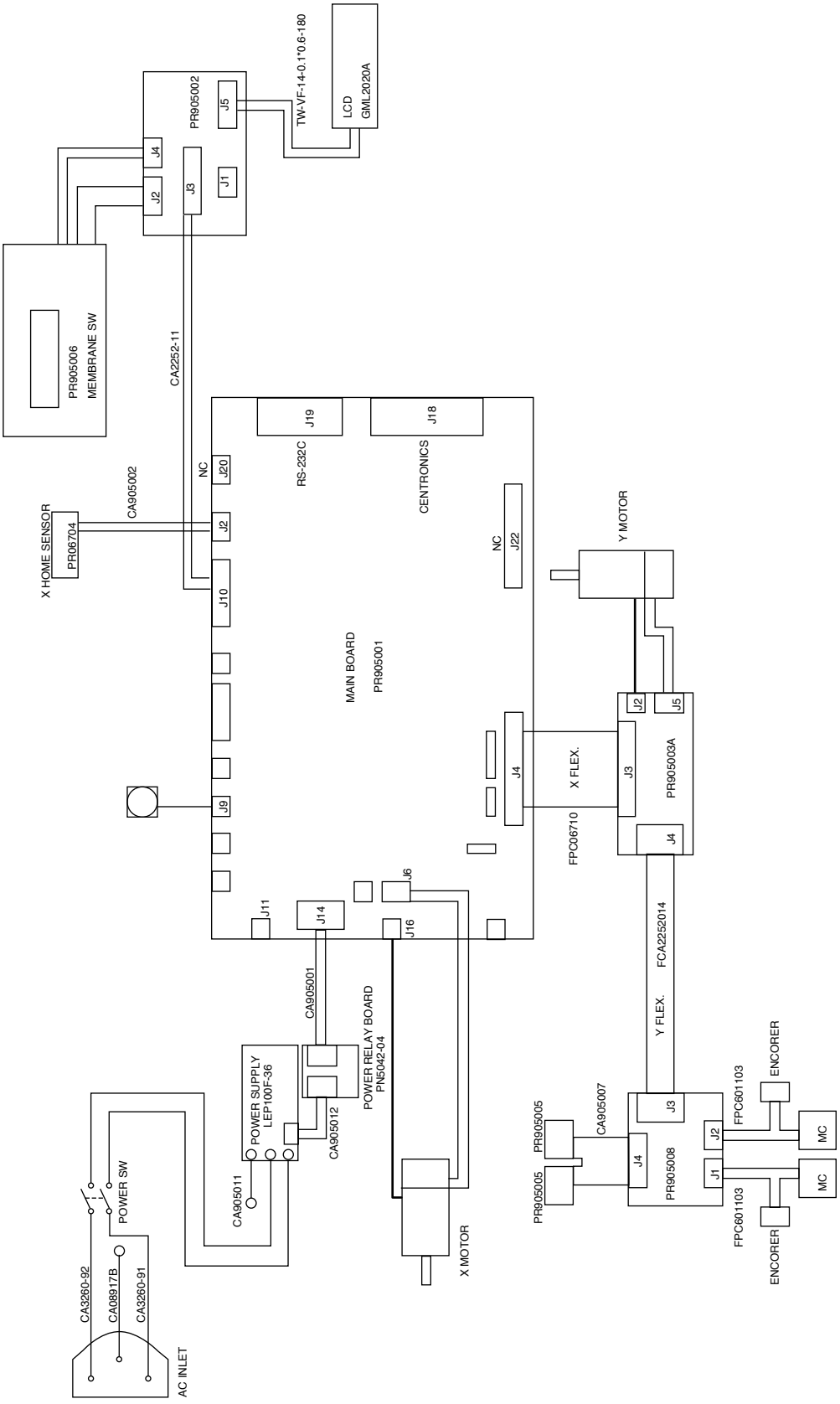
12.1.2 Wiring Diagram for FC4210-60 (Non-RoHS model)



12.1.3 Wiring Diagram for FC4200-50 and FC4200-60 (RoHS model)

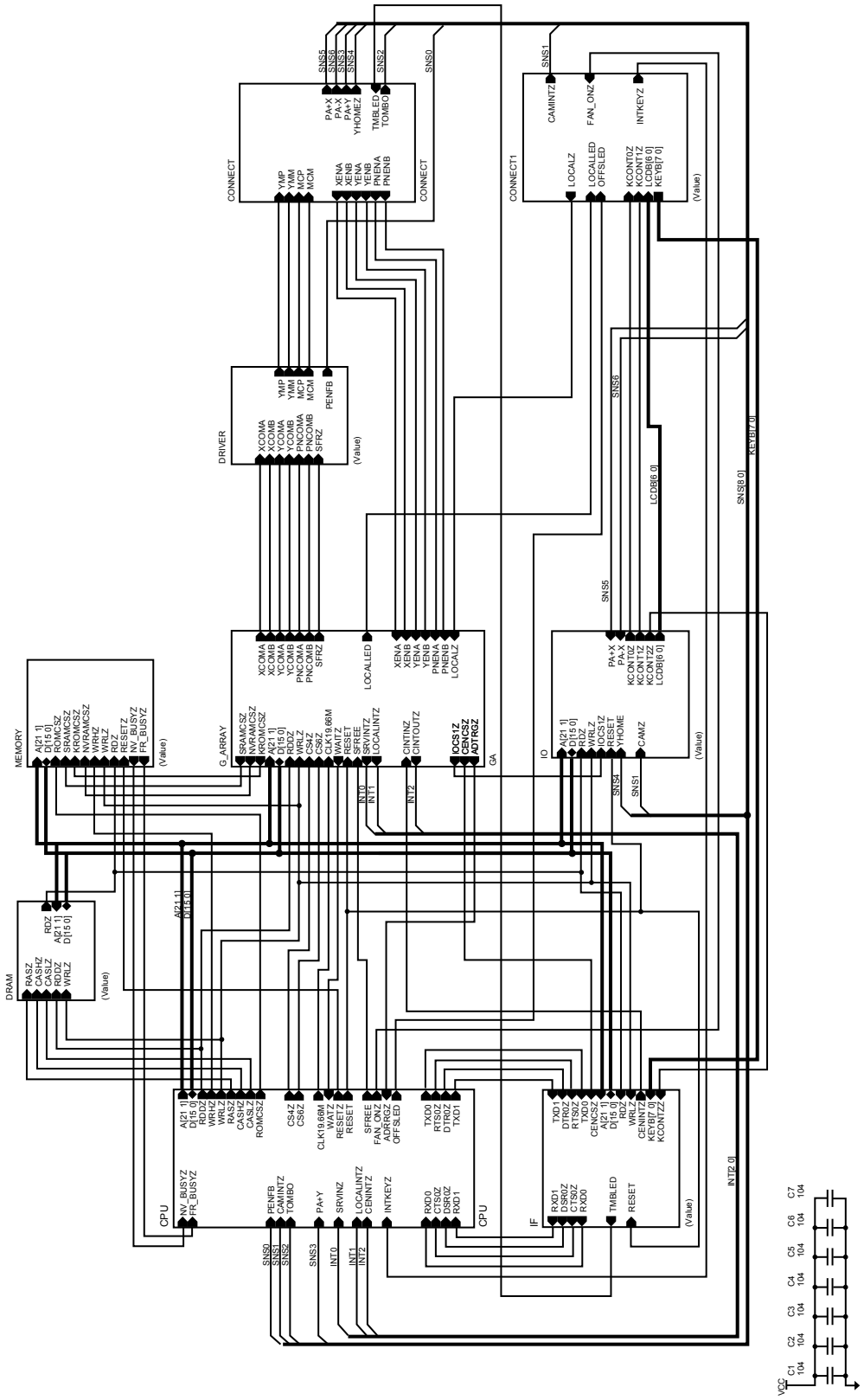


12.1.4 Wiring Diagram for FC4210-60 (RoHS model)

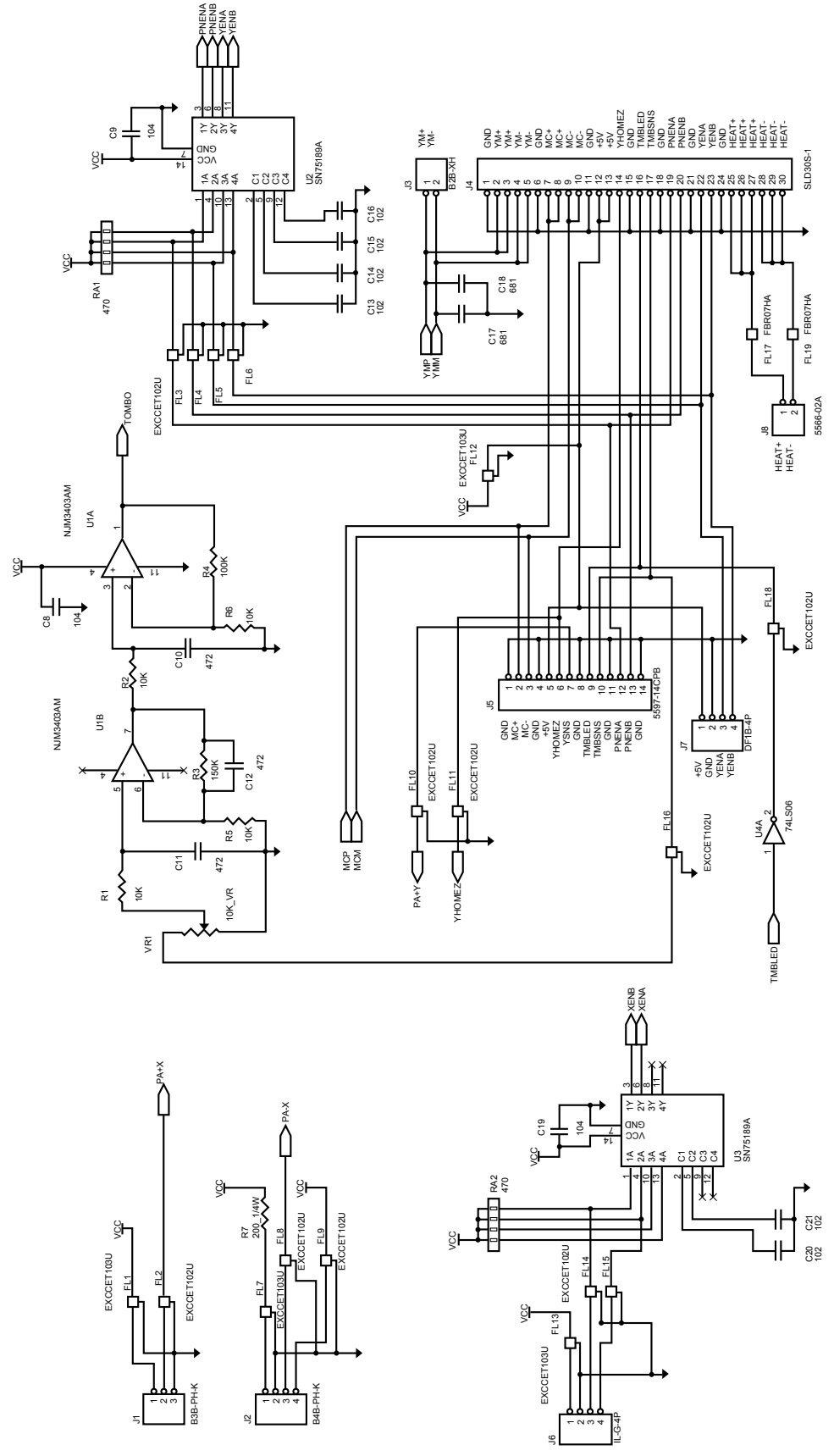


12.2 Main Board

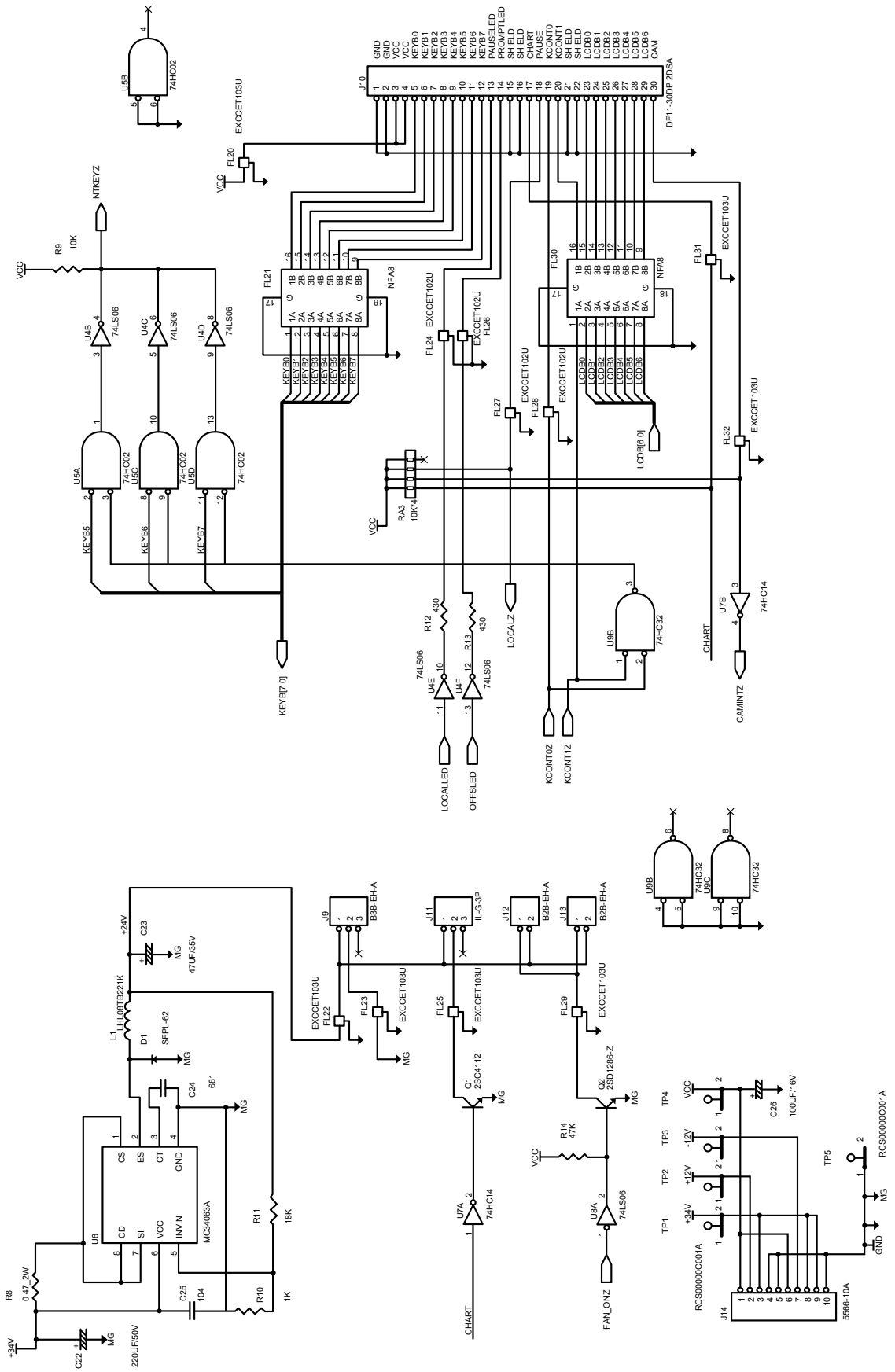
Main Board (1/10)



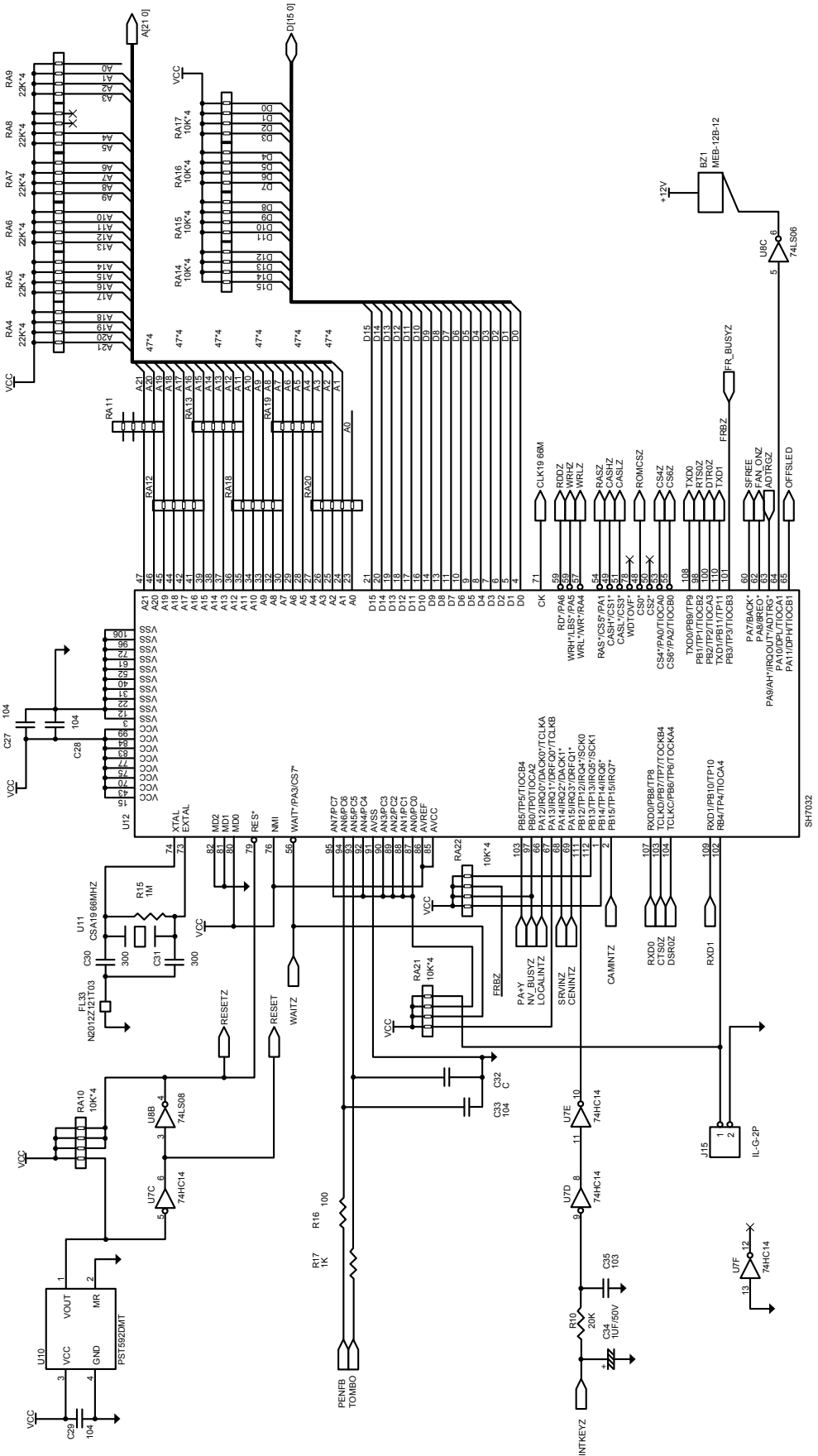
Main Board (2/10)



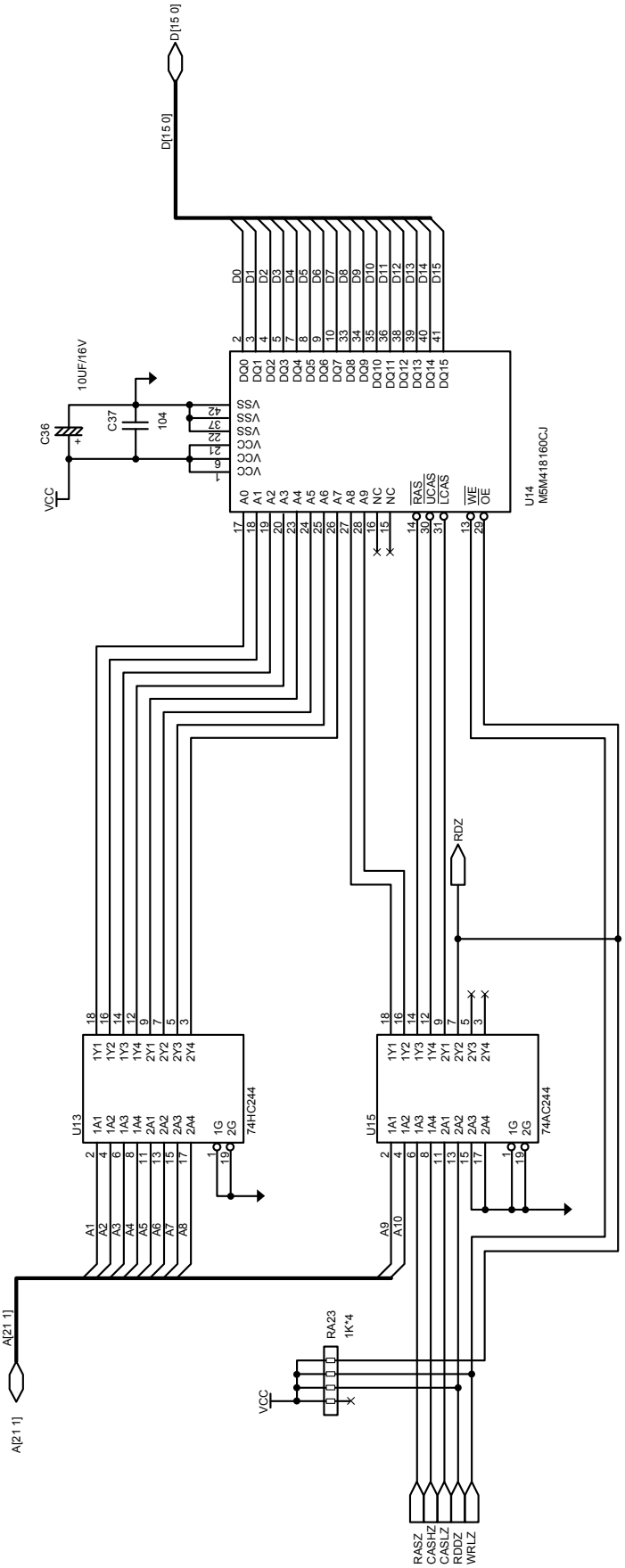
Main Board (3/10)



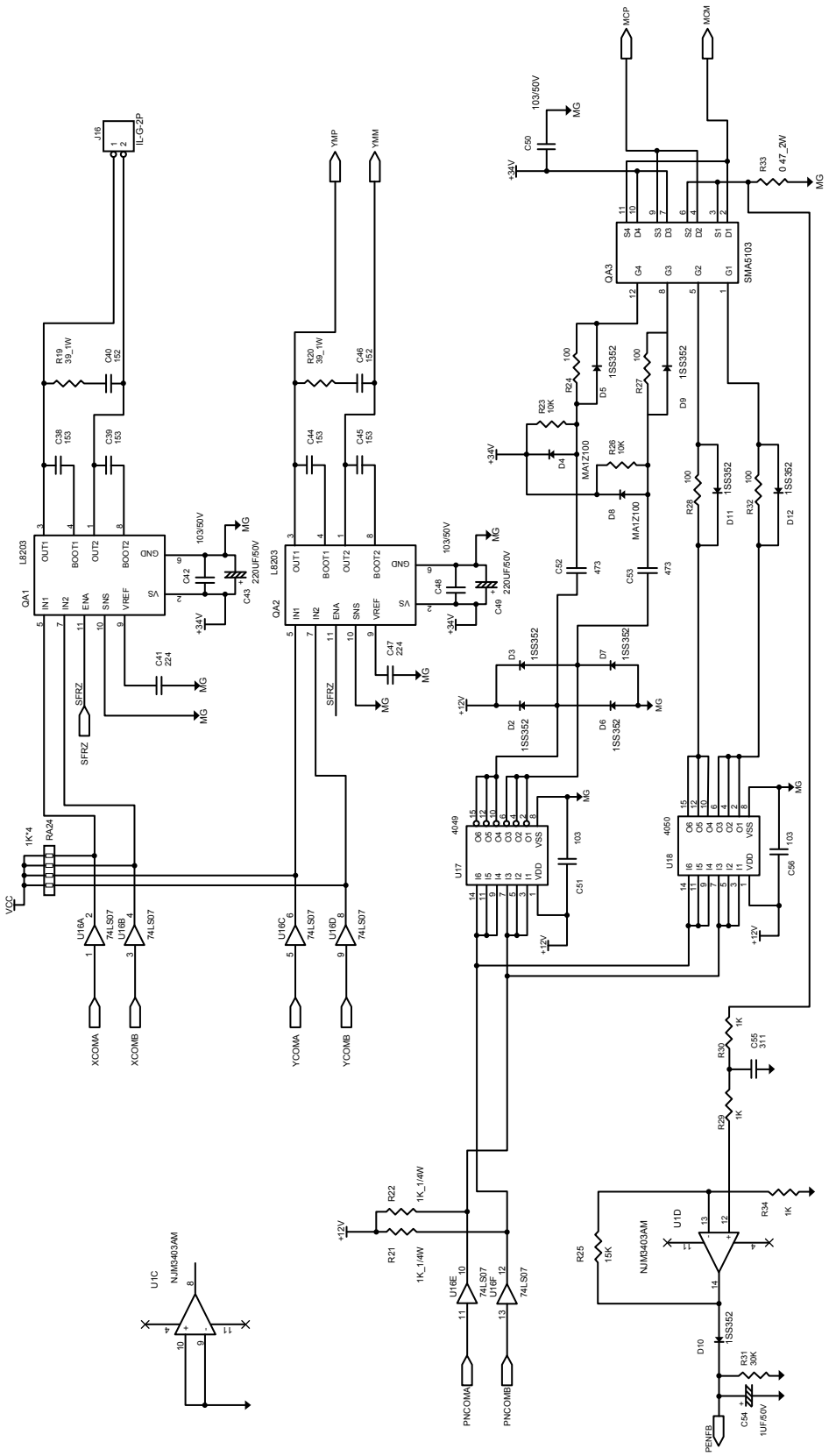
Main Board (4/10)



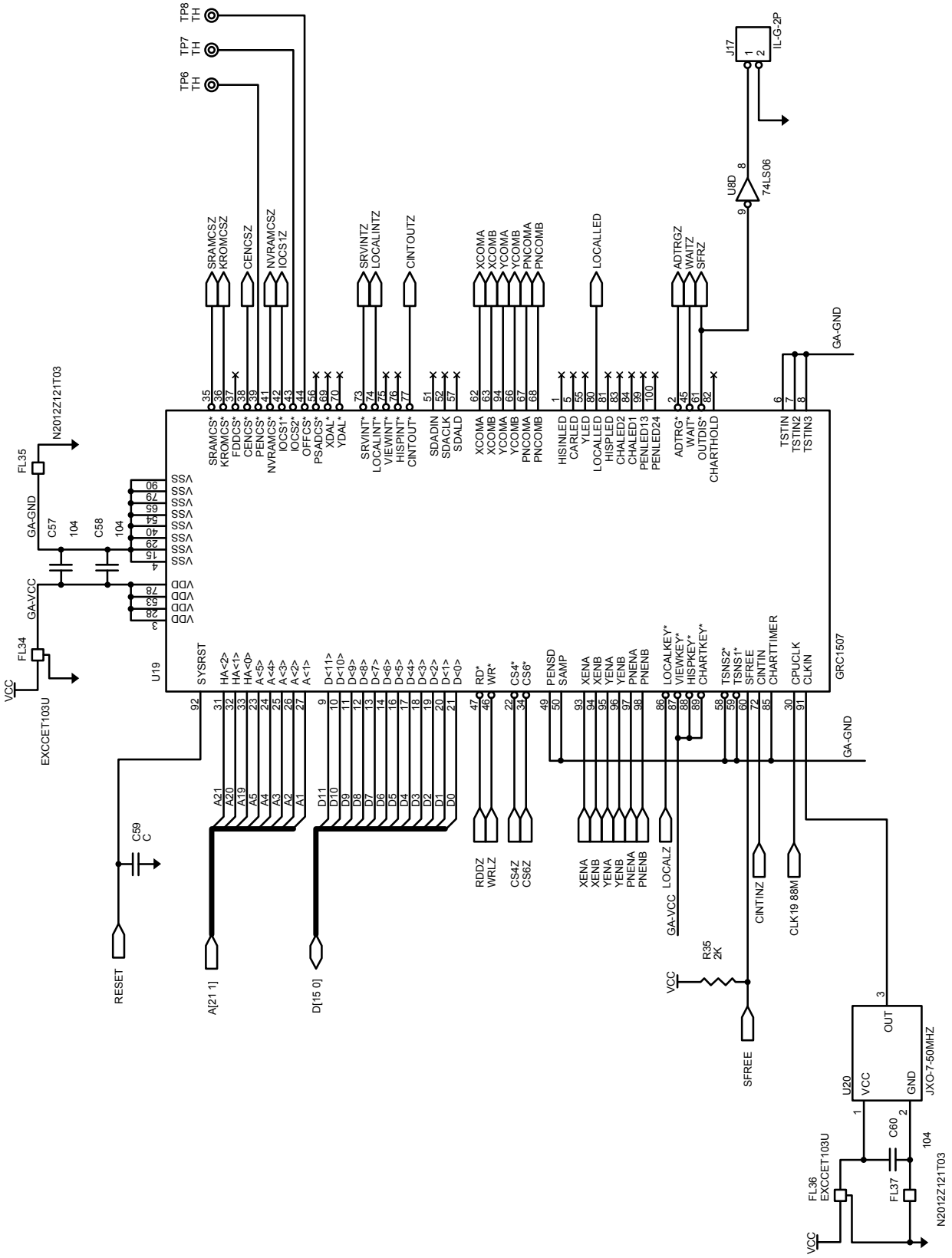
Main Board (5/10)



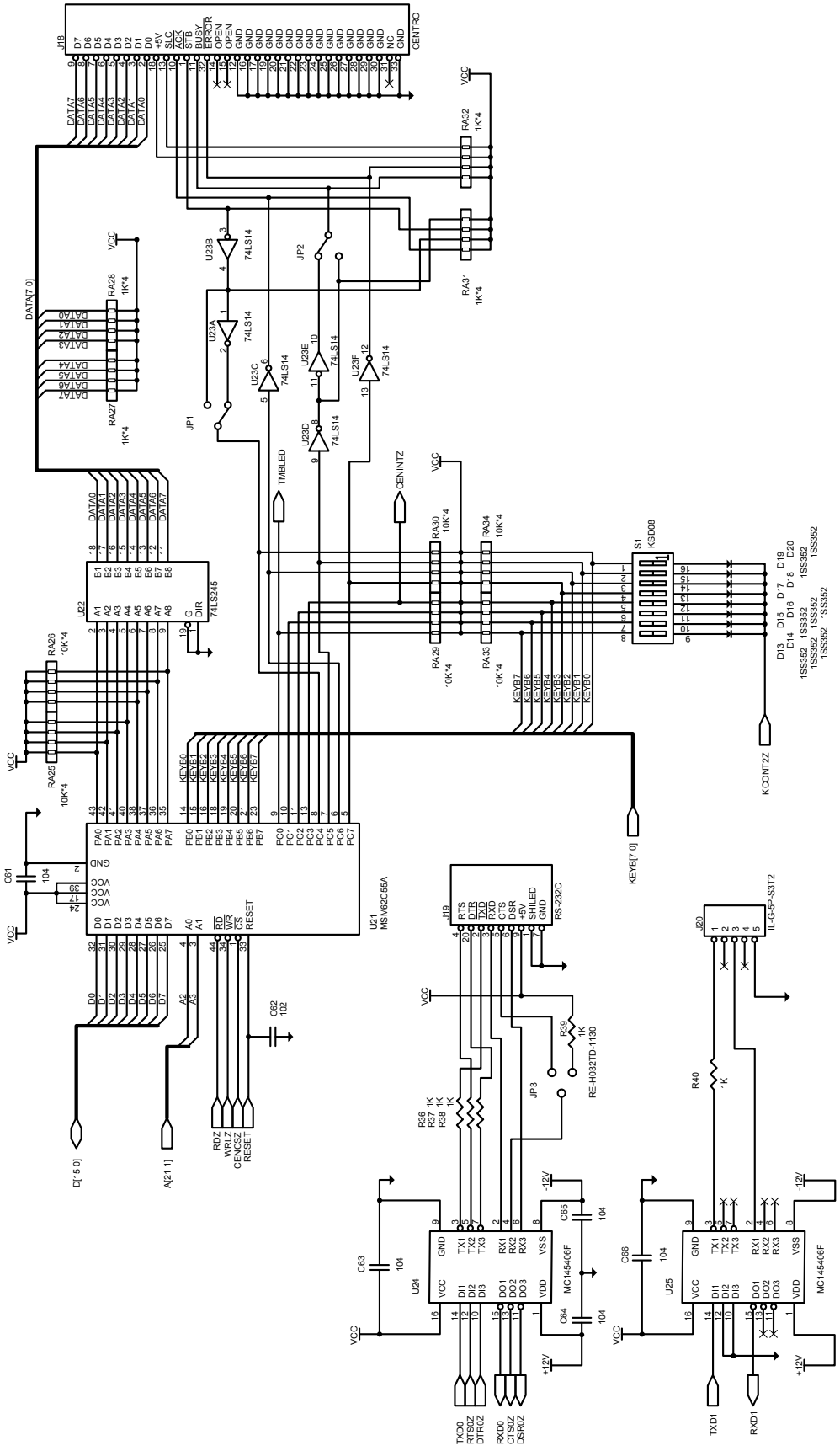
Main Board (6/10)



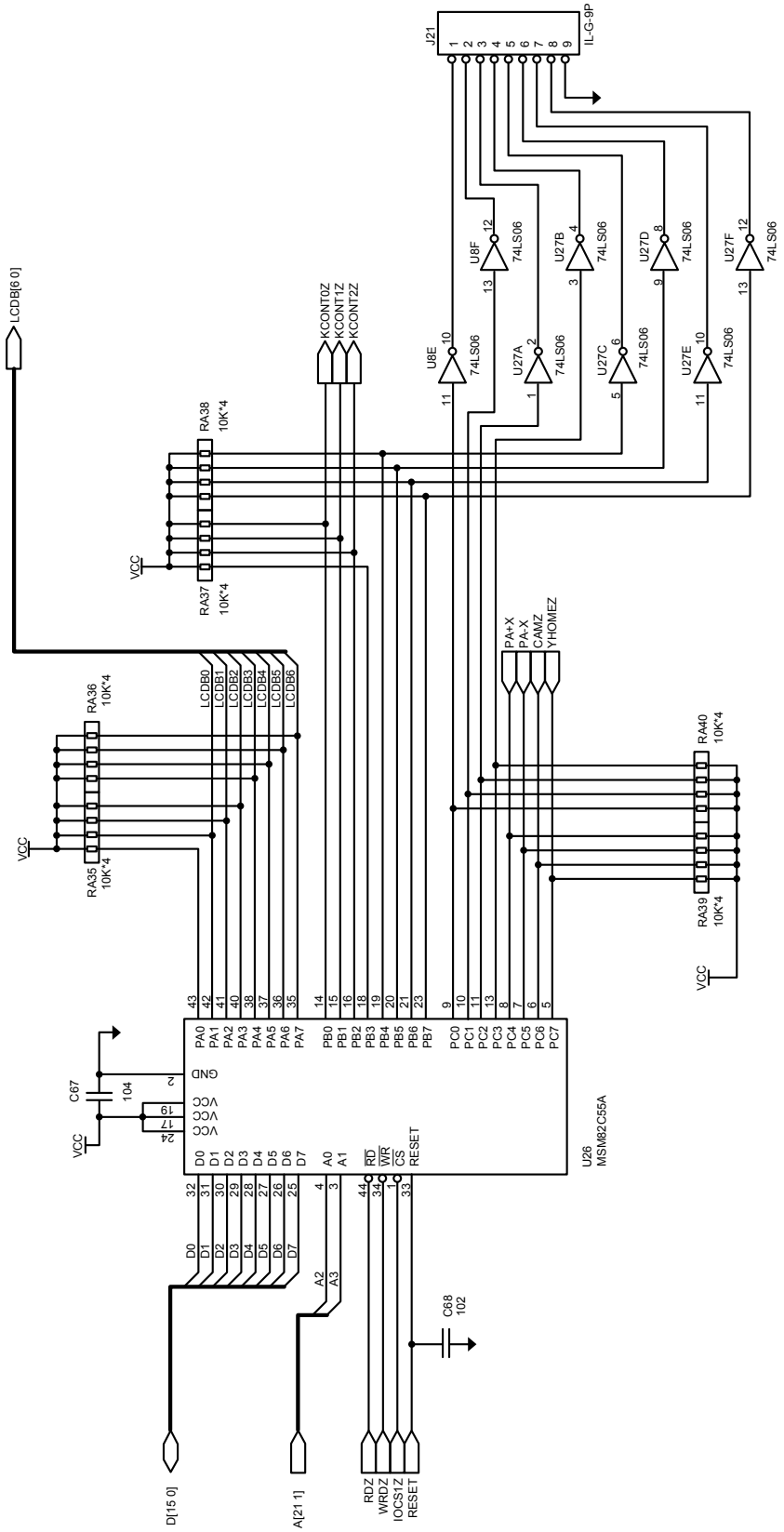
Main Board (7/10)



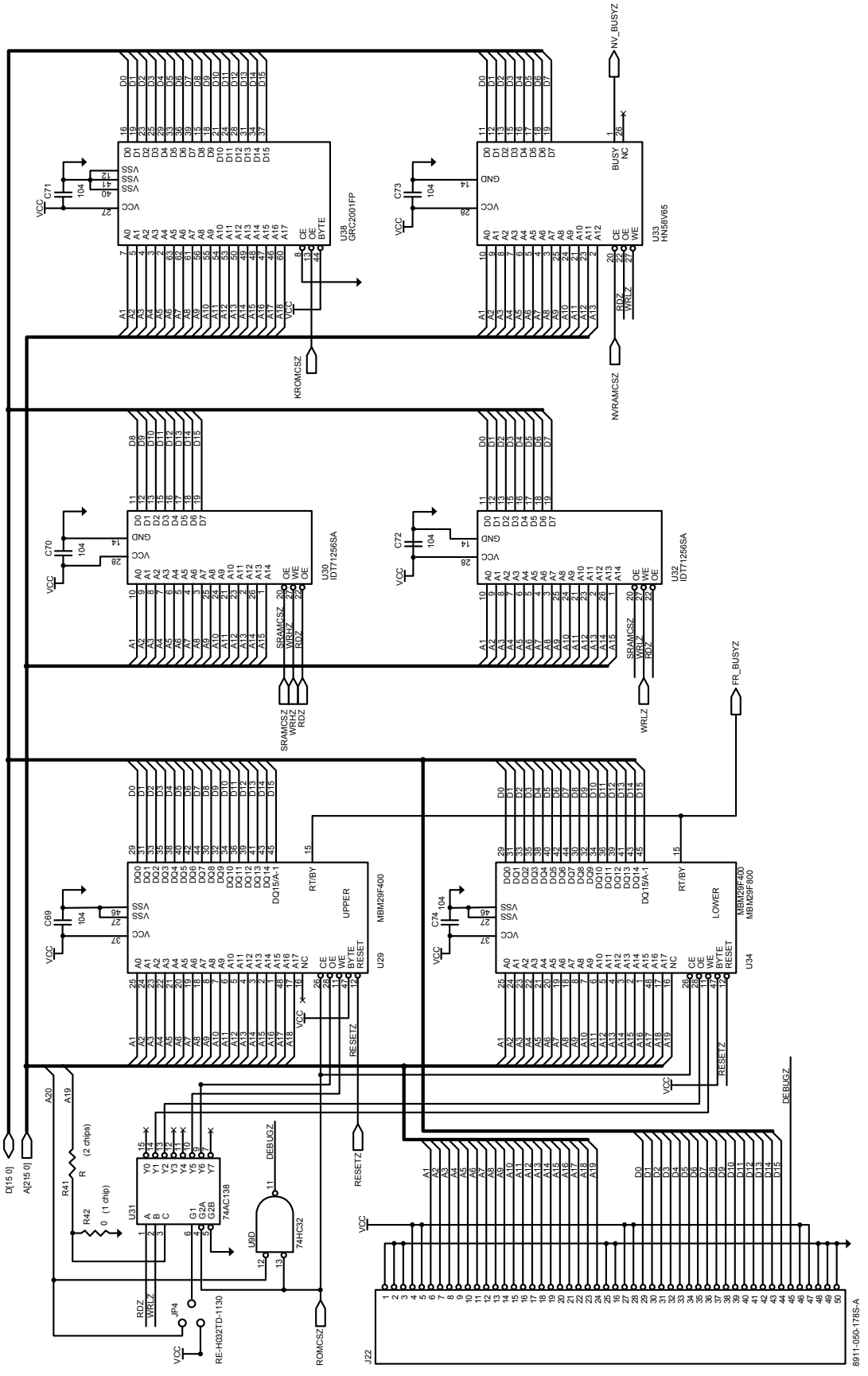
Main Board (8/10)



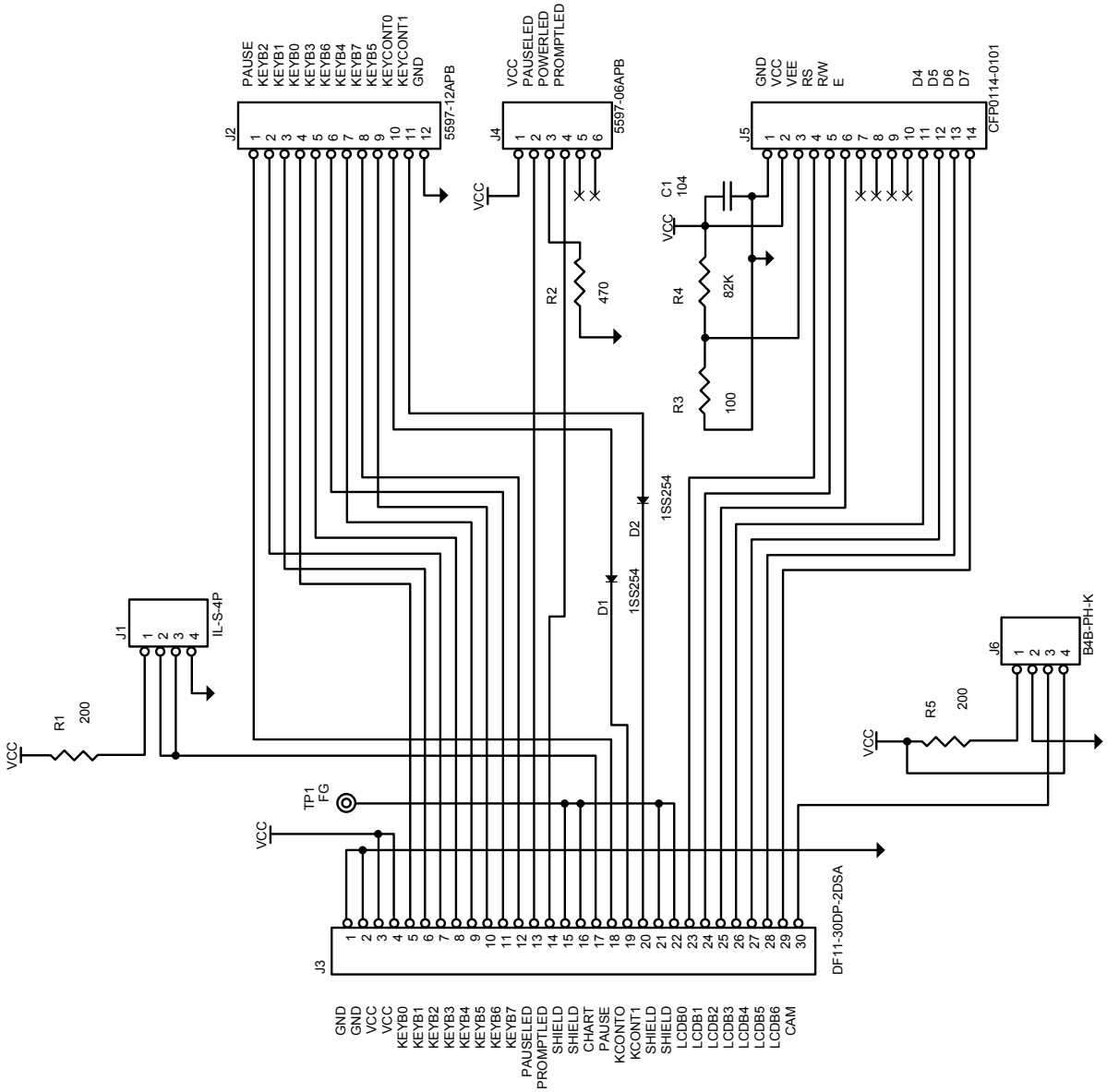
Main Board (9/10)



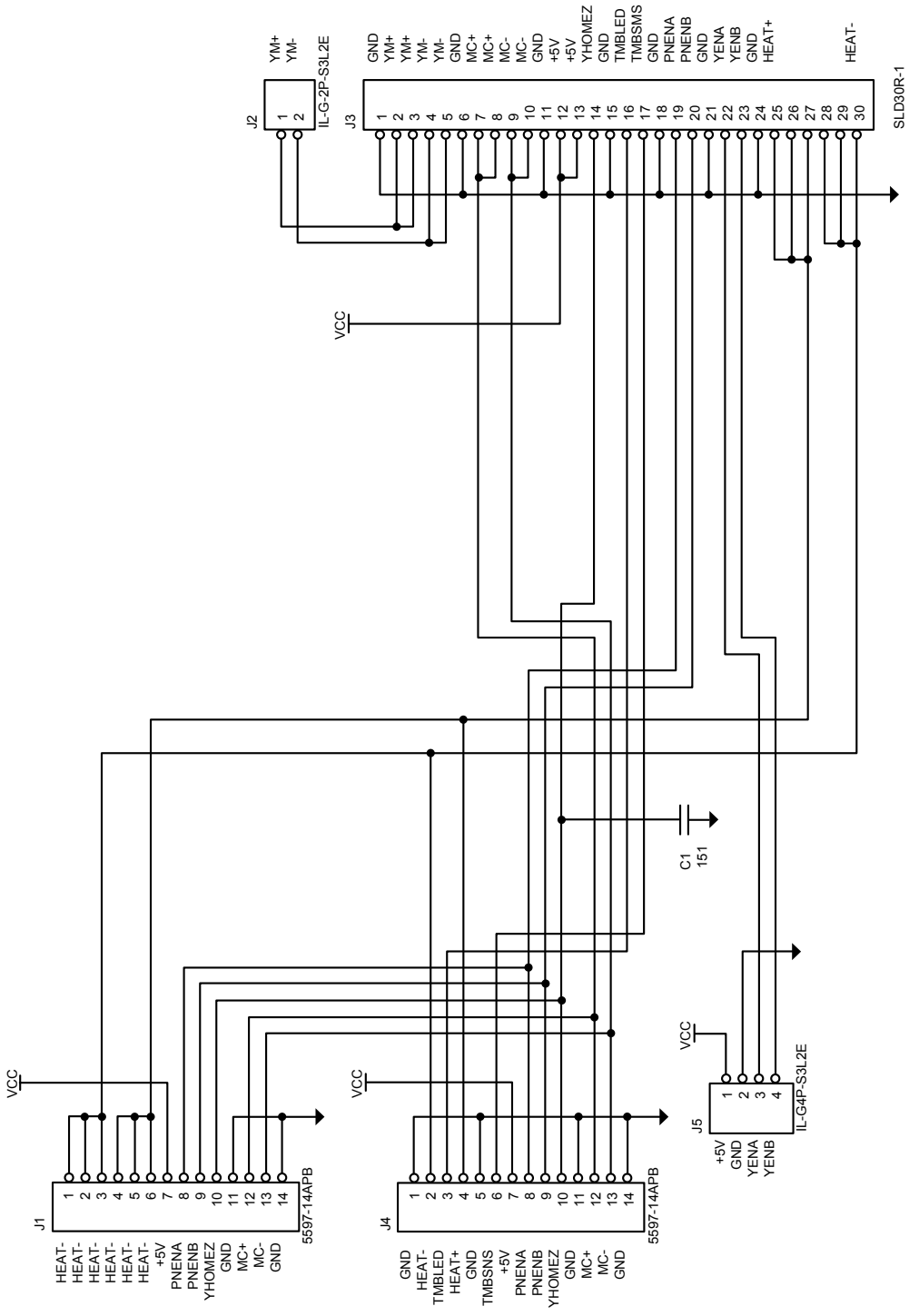
Main Board (10/10)



12.3 Control Panel Relay Board

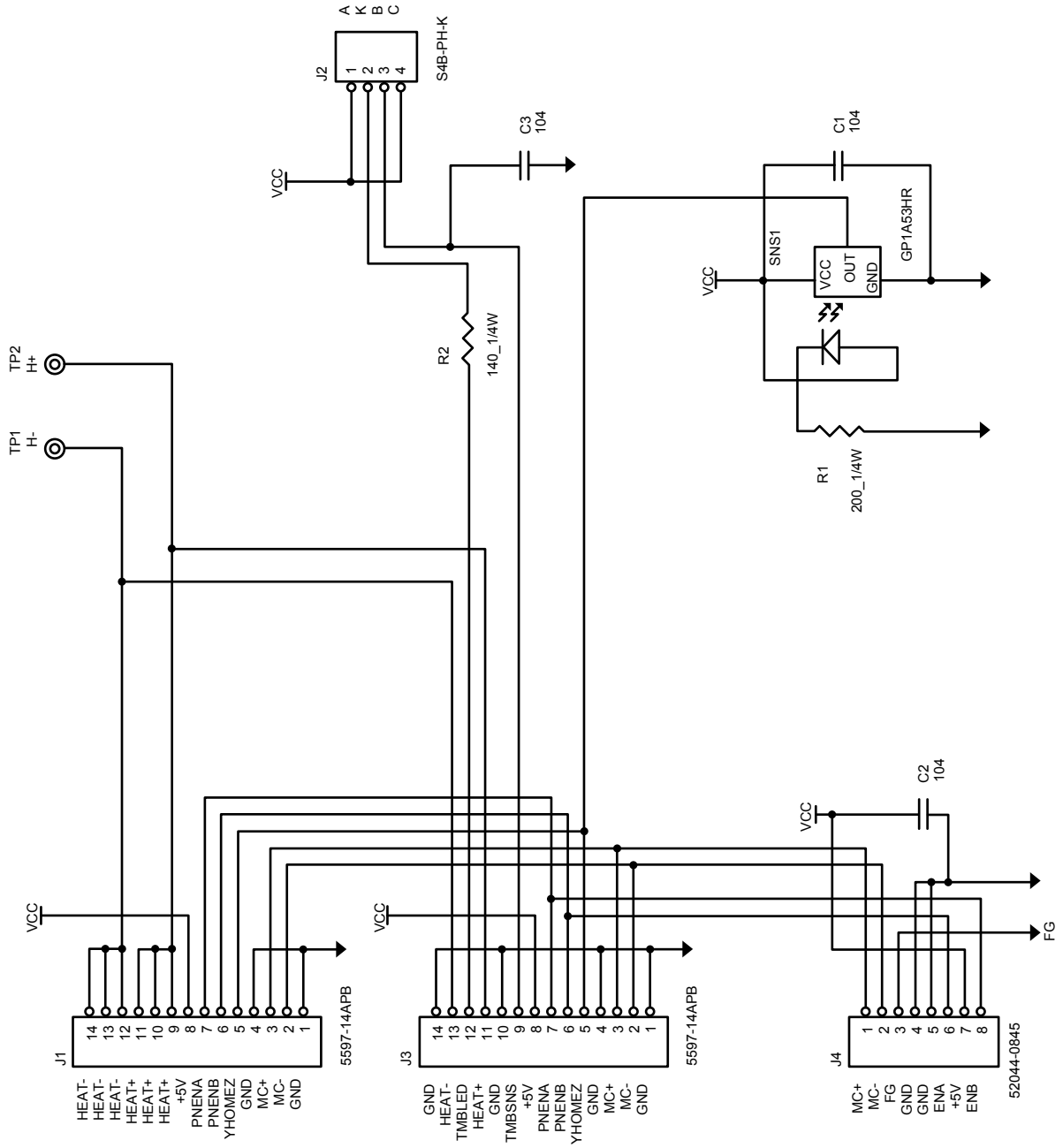


12.4 Y Motor Relay Board

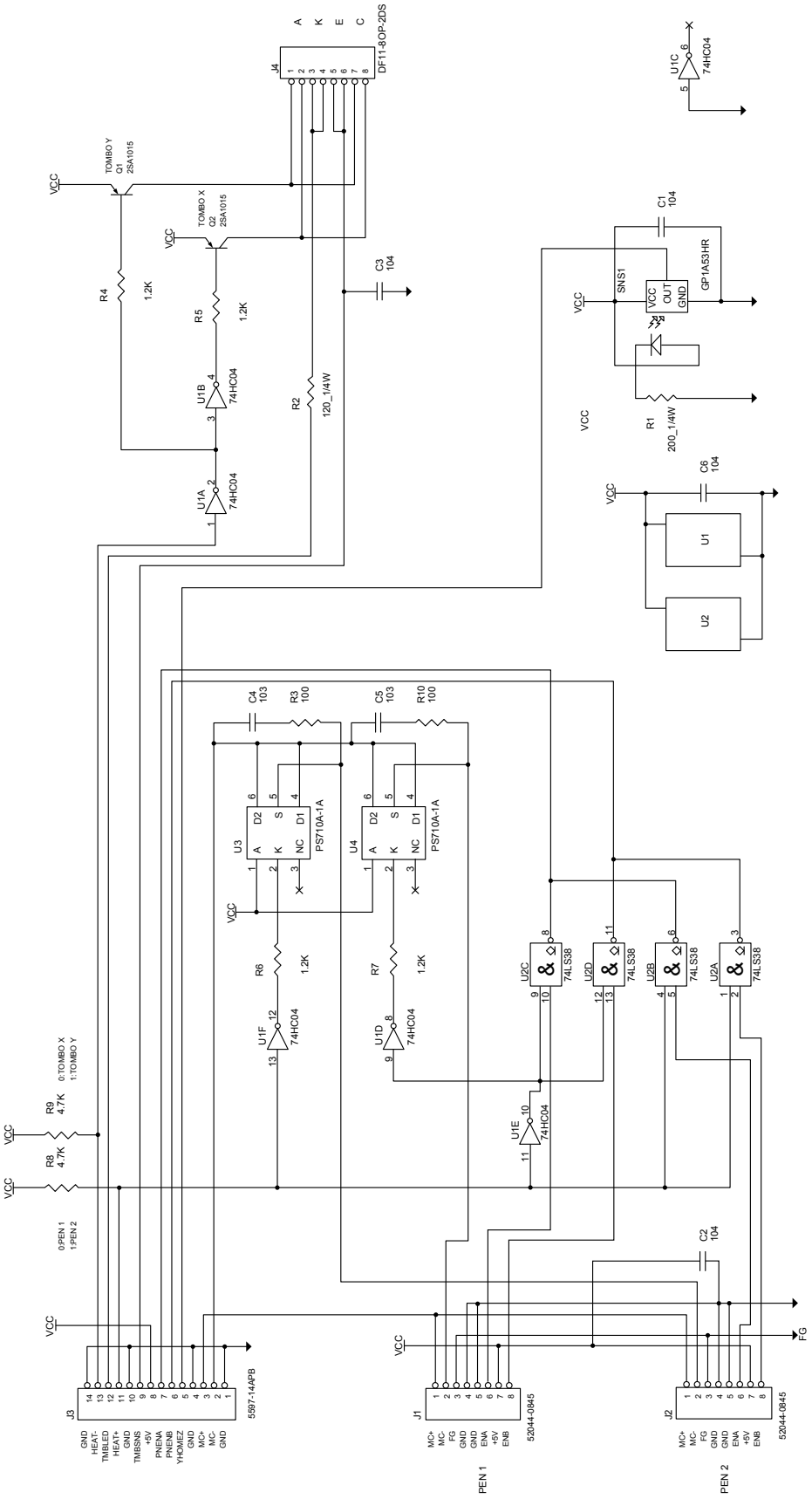


12.5 Pen Board

Pen Board for FC4200-50 and FC4200-60



Pen Board for FC4210-60



12.6 Power Relay Board (RoHS model)